

# Crossroads Project

## Hat Creek Ranger District, Lassen National Forest

### Shasta County, California

#### Purpose, Need and Proposed Action

#### Introduction

The Lassen National Forest, Hat Creek Ranger District is proposing the Crossroads Project (Crossroads, Project) to reduce insect mortality in the forested stands, reduce the fuel levels and increase fire resilience on approximately 2,646 acres within a Wildland Urban Interface (WUI) network in close proximity to various communities, unincorporated towns, highways, and critical infrastructure. The project is designed to remove dead and dying trees that are stressed from years of drought, insects, and mistletoe infestations, and to thin trees to increase the distance between crowns and increase individual tree vigor, while retaining some clumps for terrestrial habitats. The Project would reduce competing vegetation and reduce fuels in strategic locations. Further emphasis was placed on protecting residences, highways, and critical infrastructure, while connecting existing treatments whenever possible. Reduced extent and severity of wildfires in the area would improve air and water quality for the communities of Cassel, Old Station, Burney, Fall River Mills, and McArthur.

The Crossroads Project was inspired by and collaborated with the Burney-Hat Creek Community Forest and Watershed Group (Collaborative) with the goal of achieving healthy and resilient landscapes and minimizing the threat of natural disturbances such as fire around their local communities. The Collaborative includes multiple interested persons representing diverse interests and is transparent and inclusive.

Currently, Collaborative partners engaged in the planning effort on both private and National Forest System lands include the Fall River Resource Conservation District, California Department of Forestry and Fire Protection (CAL FIRE), Burney Fire Department, Shasta County Fire Department, Burney Basins Fire Safe Council, Hat Creek Valley Fire Safe Council, Fruit Growers Supply Company, Sierra Pacific Industries, Inc., W.M. Beatty and Associates, Inc., McArthur-Burney Falls State Park, and Lassen National Volcanic Park.

#### Law, Regulation and Other Direction

The Council of Environmental Quality (CEQ) regulations that implement NEPA provide for Categorical Exclusions (CEs), which allow Federal agencies to exclude from further analysis certain categories of actions that do not individually or cumulatively have a significant effect on the human environment.

The proposed actions fall under the 2014 Farm Bill authority in accordance with HFRA Sections 602 and 603. The 2014 Farm Bill (Pub. L. 113 – 79) included a provision for addressing insect and disease threats on National Forest lands. Section 8204 of the Farm Bill amended Title VI of the 2003 Healthy Forest Restoration Act (HFRA; Pub. L. 108 – 148) and established a categorical exclusion (CE) for qualifying insect and disease projects located within a designated landscape-scale watershed (HFRA Section 602(b)(1)). Projects planned under this CE are designed to reduce the risk or extent of, or increase the resilience to, insect or disease infestation and promote forest health (HFRA Sec 602(d)(1)(b)).

The Lassen National Forest proposes to design and implement treatments involving sanitation/salvage, thinning, prescribed burning, roadside/fuelbreak vegetation management, conifer removal around oaks, and management of noxious weeds. No herbicide use is proposed. In addition, road reconstruction and maintenance activities may occur. Treatments prescribed would be designed to move the area toward desired conditions and meet all standards and guidelines in the current Forest Plan.

*Table 1: 603 HFRA CE Requirements-Limitations & Project Compliance*

<b>HFRA Section</b>	<b>Action Proposed</b>
§603(b)(1)	
Project carries out forest restoration treatment.	Yes
§603(b)(1)(A)	
Project maximizes retention of old-growth and large trees, as appropriate for the forest type to the extent that the trees promote stands that are resilient to insects and disease.	Yes
§603(b)(1)(B)	
Project considers best available scientific information to maintain or restore the ecological integrity, including maintaining or restoring structure, function, composition, and connectivity.	Yes
§603(b)(1)(C)(i)-(ii)	
Project developed and implemented through a collaborative process that includes multiple interested persons representing diverse interests and is transparent and nonexclusive or meets the requirements for a resource advisory committee.	Yes
§603(c)(1)	

<b>HFRA Section</b>	<b>Action Proposed</b>
Project does not exceed 3,000 acres.	Yes
§603(c)(2)(A)-(B)	
Project areas limited to the wild-urban interface (WUI), or condition classes 2 or 3 in Fire Regime Groups I, II, or III.	Yes
§603(c)(3)(A)(i)	
No new permanent roads.	Yes
§603(c)(3)(A)(ii)	
Only maintenance and repair of permanent roads permissible.	Yes
§603(c)(3)(B)	
Temporary roads decommissioned no later than 3 years after the project is completed.	Yes
§603(d)(1)-(4)	
Project not located within designated Wilderness, Wilderness Study Areas, areas where vegetation removal is restricted or prohibited (by Congress or Presidential Proclamation), or where activities inconsistent with the LRMP (USDA 1993), as amended by the NWFP (USDA 1994).	Yes
§603(e)	
Project consistent with the LRMP (USDA 1993), as amended by the NWFP (USDA 1994).	Yes
§603(f)	
Conduct public notice and scoping.	Yes

The Crossroads Project follows all applicable Standards and Guidelines of the Lassen National Forest Land and Resource Management Plan LRMP (USDA 1993), as amended by the NWFP (USDA 1994).

### **Project Area**

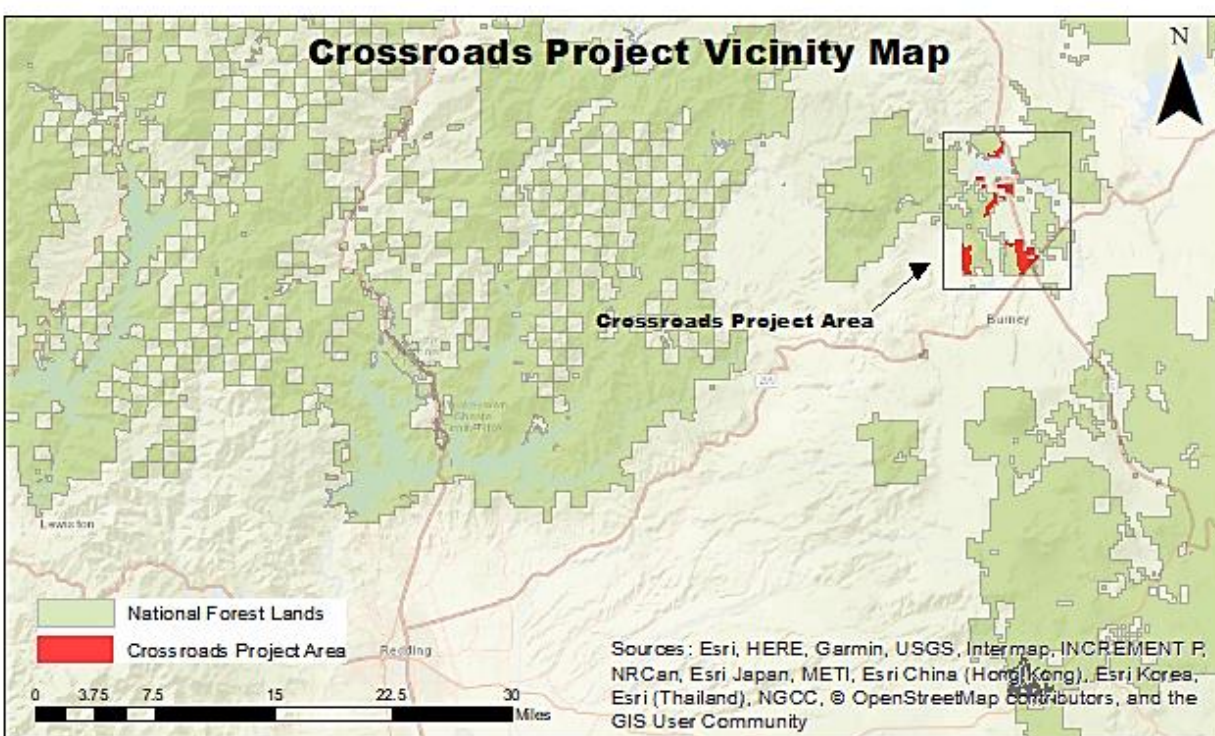
The Crossroads project area is located approximately 2 miles northeast of Burney, California and is within the Shasta-Trinity National Forest administered by the Lassen National Forest (LNF). The project area extends north from the junction of Highways 299 and 89 (Four Corners) to Lake Britton. Land ownership in the area includes small

private landowners, timber companies, ranchers, public lands and the McArthur-Burney Falls State Park. The legal description is described below.

Table 2: Legal Description of the Crossroads Project

Portions of Sections	Township	Range	Base Meridian
3-6, 8-9, 17, 19, 21, 22, 26, 27, 28, 30, 31, 34, and 35	36N	3E	Mount Diablo
17, 19, and 30	37N	3E	Mount Diablo

Figure 1: Vicinity Map with approximate location of the proposed treatment areas



The project area is located within several sixth level Hydrologic Unit Codes (HUC 12) including: Goose Creek, Rock Creek-Pit River, Burney Falls-Burney Creek, Soldier Creek-Pit River, Town of Burney-Burney Creek, and Cayton Creek. The project area is located within two fifth level Hydrologic Unit Codes (HUC 10) including: Kosk Creek-Pit River and Burney.

### Project Land Allocation

The project encompasses approximately 2,646 acres of National Forest System (NFS) land. This area falls within the scope of the Northwest Forest Plan (USDA 1994) and land allocation types in the Crossroads project are provided below.

Table 3: Northwest Forest Plan (NWFP) Land Allocation Categories in Crossroads

Stand Type	Acres	Percentage
Matrix	2,582 acres	98 percent
Riparian Reserve	64 acres	2 percent
Total	2,646	100 percent

Matrix is an integral part of the management direction included in these standards and guidelines. Production of timber and other commodities is an important objective for the matrix. However, forests in the matrix function as connectivity between Late-Successional Reserves and provide habitat for a variety of organisms associated with both late successional and younger forests. Standards and guidelines for the matrix are designed to provide for important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next, and maintenance of ecologically valuable structural components such as down logs, snags, and large trees. The matrix would also add ecological diversity by providing early-successional habitat. Stands in the matrix can be managed for timber and other commodity production, and to perform an important role in maintaining biodiversity.

Silvicultural treatments of forest stands in the matrix can provide for retention of old-growth ecosystem components such as large green trees, snags and down logs, and depending on site and forest type, can provide for a diversity of species. Retention of green trees following timber harvest in the matrix provides a legacy that bridges past and future forests. Retaining green trees serves several important functions including snag recruitment, promoting multistoried canopies, and providing shade and suitable habitat for many organisms in the matrix. Retaining green trees of various sizes, ages, and species, in well-distributed patches as well as dispersed individuals, would promote species diversity. These trees may also act as refugia or centers of dispersal for many organisms including plants, fungi, lichens, small vertebrates, and arthropods. Patches of trees may provide protection for special microsites such as seeps, wetlands, or rocky outcrops. Trees retained within the Riparian Reserves can contribute to overall retention objectives but would generally not be sufficiently dispersed across the landscape to fully satisfy these objectives.

Diversity of tree structure should be considered when selecting trees for retention. Complex canopy structure and especially leaning boles are beneficial for some lichens. Trees that are asymmetrical provide a diversity of habitat substrates, and often have more lichen and moss epiphytes on large lateral limbs than symmetrical trees. Location of green trees is also important (e.g., ridgelines are optimal locations for lichen dispersal). Coarse woody debris is essential for many species of vascular plants, fungi, liverworts, mosses, lichens, arthropods, salamanders, reptiles and small mammals.



Because of drier microclimates, logs in the matrix may be occupied by species different from those found on coarse woody debris in late-successional forests. However, these logs may provide transitional islands for the maintenance and eventual recovery of some late-successional organisms in the matrix.

Silvicultural systems within the matrix contribute to management of the Late-Successional Reserves. Fire and fuels management in the matrix can reduce the risk of fire and other largescale disturbances that would jeopardize the reserves. Harvesting trees immediately adjacent to Late-Successional Reserves may result in increased wind damage along boundaries. In such cases, "feathering" stands within harvest units may be appropriate to reduce this risk. Local expertise would be essential in designing meaningful strategies for wind protection. (NWFP-Standards and Guidelines C-39)

**Riparian Reserves** are portions of watersheds where riparian-dependent resources receive primary emphasis and where special standards and guidelines apply. Standards and guidelines prohibit and regulate activities in Riparian Reserves that retard or prevent attainment of the Aquatic Conservation Strategy objectives. Riparian Reserves include those portions of a watershed directly coupled to streams and rivers, that is, the portions of a watershed required for maintaining hydrologic, geomorphic, and ecologic processes that directly affect standing and flowing waterbodies such as lakes and ponds, wetlands, streams, stream processes, and fish habitats. Riparian Reserves include areas designated in current plans and draft plan preferred alternatives as riparian management areas or streamside management zones and primary source areas for wood and sediment such as unstable and potentially unstable areas in headwater areas and along streams. Riparian Reserves occur at the margins of standing and flowing water, intermittent stream channels and ephemeral ponds, and wetlands. Riparian Reserves generally parallel the stream network but also include other areas necessary for maintaining hydrologic, geomorphic, and ecologic processes. (NWFP-Standards and Guidelines C-31)

In addition to the matrix and riparian reserves classifications the project area is further broken down into habitat types as designated by the California Wildlife Habitat Relationship system (CWHR). CWHR classifies existing vegetation types and was developed to recognize and logically categorize major vegetative complexes at a scale sufficient to predict wildlife-habitat relationships. CWHR is used throughout the document to further help describe the existing habitat condition and proposed treatments.

## Background

In the last 5 years, the area surrounding the Crossroads project area has experienced several large catastrophic wildfires including the 2014 Eiler Fire (32,416 acres), Bald Fire (39,736 acres), and the Day Fire (13,153 acres) further to the east. Several smaller

human caused fires also recently occurred in the area, including the 2018 Corner Fire (17 acres) which occurred just north of four corners, as well as the Power Fire, and the Hat Fire.

The Federal Register (66 FR 751 pp 751-777 Notice Urban Wildland Interface Communities within the Vicinity of Federal Lands That Are at High Risk from Wildfire 01/04/2001) definition, combined with a quantitative criteria, splits the WUI into two categories:

Intermix WUI, or lands that contain at least one housing unit per 40 acres in which vegetation occupies more than 50 percent of terrestrial area, a heavily vegetated intermix WUI is an area in which vegetation occupies over 75 percent of terrestrial area (at least 5 km<sup>2</sup>).

Interface WUI or lands that contain at least one housing unit per 40 acres in which vegetation occupies less than 50 percent of terrestrial area (at least 2.4 km<sup>2</sup>).

Structures in intermix WUI are interspersed with vegetation, whereas, homes in interface WUI are adjacent to heavy vegetation.

Forest fuel conditions in the Crossroads project area support high severity wildfires and present risks to emergency responders, the public, and forest resources. Treatments have been strategically located along major roads, ridgelines, communities, and property boundaries to ensure WUI objectives are accomplished. The proposed treatment areas are non-contiguous, and range in size from 36 to 1,085 acres; many of the targeted areas would connect existing (previous) treatment areas.

### Purpose and Need

The purpose of the Crossroads Project is to reduce tree mortality, maximize the retention of old growth and large trees to the extent that the stands that are resilient to insect and disease, lessen the amount of hazardous fuels, and reduce the risk or extent of, or increase the resilience to, wildfires. The combination of fuel and vegetation changes (primarily driven by fire suppression and a warming and drying climate) within and surrounding the Crossroads Project have resulted in a landscape that is both less resilient to the inherent disturbances including wildland fire, drought, insects, and diseases. Much of the forest condition in the area is also outside of the natural range of variability as tree mortality and decadent brush are all present at higher levels than would naturally occur in this forest type. Consequently, the Crossroads project area is being evaluated for opportunities to incorporate Wildland Urban Interface activities, forest health activities, and woodland restoration.

## Project Goals:

1. Improve the resilience of timber stands to future disturbance events by removing dead and dying trees and increasing the distance between tree crowns while retaining terrestrial habitat features and promoting drought tolerant species resilient to insects and disease.
2. Enhance oak woodlands primarily by decreasing conifer/oak competition and reducing hazardous fuels.
3. Improve ingress and egress by removing brush and ladder fuels along roads and connecting past treatment areas that can moderate fire behavior at a landscape scale to protect lives and communities located within WUIs.
4. Improve and further refine the transportation system to provide an efficient transportation system for safe public access and travel.
5. Reduce surface fuels so that post treatment fire behavior is four feet or less flame length. Engine and hand crews can directly attack four foot or less flame lengths.

**Goal 1:** Improve the resilience of timber stands to future disturbance events by removing dead and dying trees and increasing the distance between tree crowns while retaining terrestrial habitat features and promoting drought tolerant species resilient to insects and disease. (FHP Report NE17-04)

**Existing Condition:** Many of the forested areas within and adjacent to the Crossroads Project have received limited forest management and are currently experiencing elevated levels of tree mortality caused by drought and bark beetles. Pockets of mortality occur within dense clumps, effecting primarily ponderosa pine in drier stands, and white fir and Douglas-fir in mixed conifer stands in low elevation, warmer sites. This mortality combined with high fuel loads of dead-down trees and a dense understory has put many stands at risk of wildfire.

The drier southeastern portion of the project area is dominated by Eastside Ponderosa Pine (EPN) type. Ponderosa pine (*Pinus ponderosa*) stands usually have California black oak (*Quercus kelloggii*), Oregon white oak (*Quercus garryana*) and western juniper (*Juniperus occidentalis*) component intermixed in the stands. Approximately 34 percent of the project areas is classified as eastside ponderosa pine, with a history of decline and mortality due to a complex of drought and insects, including black pine leaf scale, western pine beetle, Ips spp., and mistletoe infestations.

Sierra Mixed Conifer (SMC) type is found in the wetter northwest portion of the project area, consisting of ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), white fir (*Abies concolor*), sugar pine (*Pinus lambertiana*), incense cedar



(*Calocedrus decurrens*) and California black oak (*Quercus kelloggii*). Approximately 14 percent of the project area consists of mixed conifer stands with high proportions of small diameter white fir and Douglas-fir which have become established in the absence of the natural fire regime.

Portions of the project area outside of the WUI are within Condition Class 3 in Fire Regime Group I, as defined by LANDFIRE an interagency Landscape Fire and Resource Management Planning tool, and these areas have a very high wildfire hazard potential.

**Desired Conditions:** The goal of this project is to allow forest stands to better cope with drought stress, insect infestation and disease outbreaks. Treatments would modify landscape-level wildfire behavior by reducing the spread and extent of high severity wildfire. Vegetation would be managed to create forest conditions that are more resilient to wildland fires and help restore ecological processes that include open growing space, providing a flush of soil nutrients, and increasing plant diversity, while maintaining desired forest structure. The desired forest structure would consist of uneven-aged, multistoried, stands that would limit the spread of crown fires. Species composition would be modified to favor shade-intolerant oak and fire-resistant pines and decrease the relative density of shade tolerant white fir and Douglas-fir. Smaller diameter trees would be removed to decrease competition for soil moisture and light resources and include the retention of old growth and large trees.

**Need for Action:** There is a need to treat and reduce vertical (ladder fuels) arrangement and surface fuels within the stands, improving the chance that treated stands should survive a wildfire. These treatments are needed to be done in a timely manner and would aid the ability to fight and control future fire events.

**Goal 2:** Enhance oak woodlands primarily by decreasing conifer/oak competition and reducing hazardous fuels.

**Existing Condition:** Montane Hardwood (MHW) and Montane Hardwood Conifer (MHC) woodlands are typically composed of a pronounced hardwood tree layer (California black oak, Oregon white oak), with an infrequent and poorly developed shrub stratum, and a sparse herbaceous layer. Montane Hardwood Conifer (MHC) woodlands are usually found on the driest sites and have shallow soils. The stands are comprised of California black oak (*Quercus kelloggii*), Oregon white oak (*Quercus garryana*), and scattered ponderosa pine (*Pinus ponderosa*), and an occasional white fir (*Abies concolor*) with a vigorous brush component.

**Desired Conditions:** Opportunities exist to enhance growing conditions for older Oregon white and California black oaks through radial thinning.

**Need for Action:** The woodlands need to be treated to reduce conifer and oak competition and improve the growing conditions for the oak woodlands. Reduced competition from both conifers and competing oaks would increase available soil moisture and increase individual tree growth.

**Goal 3:** Improve ingress and egress by removing brush and ladder fuels along roads that can moderate fire behavior at a landscape scale to protect lives and communities located within WUIs.

**Existing Condition:** Tree mortality combined with high fuel loads of dead-down trees and a dense understory has put many stands at risk of wildfire. The existing fuel condition poses a substantial hazard to wildland urban interface areas, including public and firefighter safety during access and egress, and hampering the ability of firefighters to safely and effectively suppress wildfire.

**Desired Conditions:** The desired condition for this project would be to decrease the fuel loads to increase resilience to wildfire, and re-introducing fire into a fire adapted ecosystem, when feasible. This project proposes to reduce the threat posed by wildfire to lives, property, resources, and to enhance the fire resilience of the surrounding forest. Removing dense understory vegetation and excess forest litter would reduce surface fire flame lengths (less than 4 feet in height), allowing for safer more efficient control of wildfires, and decreased fire severity. Additionally, this project would expand the defensible space around private homes in the WUI and limit the spread into the adjacent wildlands.

**Need for Action:** There is a need to treat existing fuel conditions that pose a substantial hazard to wildland urban interface areas, including public and firefighter safety during access and egress, while hampering the ability of firefighters to safely and effectively suppress wildfire.

**Goal 4:** Improve and further refine the transportation system to provide an efficient transportation system for safe public access and travel.

**Existing Condition:** The existing transportation system would be used to provide access to treatment units.

**Desired Conditions:** The desired condition within the project area is an efficient transportation system that provides access for current and anticipated management needs. Where existing roads systems are not adequate to provide access to treatment areas, temporary roads may be constructed. Upon completion of use, temporary roads would be decommissioned. Road maintenance would include dust abatement, erosion controls, and maintenance; all of which would be implemented using best management

practices. (USDA. 2012. National Best Management Practices for Water Quality Management on National Forest System Lands).

**Need for Action:** The Lassen Forest Plan provides direction to maintain all system roads and related structures to protect resources, meet contractual obligations, and provide an efficient transportation system to serve both current and anticipated management objectives. Roads shall be maintained and/or improved to provide safe public access and travel and contribute to the economical and efficient management of National Forest System lands.

**Goal 5:** Reduce surface fuels so that post treatment fire behavior is four feet or less flame length. Engine and hand crews can directly attack four foot or less flame lengths.

**Existing condition:** Due to mortality, there is a build-up of surface and ladder fuels that, during 90<sup>th</sup> percentile fire weather, the project area would experience flame lengths greater than four feet. Fire crews cannot fight fire directly on the fire's edge when flame lengths are greater than four feet. The ladder fuels and current crown condition can lead to torching which would create spot fires that would contribute to fire spread.

**Desired Condition:** Treat the surface fuels so that during 90<sup>th</sup> percentile fire weather, flame lengths would be less than four feet. Reduce the ladder fuels in the project area so torching/crowning would not be an issue during initial attack.

**Need for Action:** Treat the surface fuels by underburning, machine piling and/or hand piling.

*Table 4: Crossroad Treatment Units, CWHR Class, Acreage by Class, Estimated Average Conifer Trees per Acre, Estimated Basal Area per acre, and Desired Basal Area per acre.*

Treatment Unit	CWHR Class <sup>3</sup>	Acres per CWHR Class	Total acres per unit <sup>1</sup>	Estimated Conifer Trees per Acre	Estimated Conifer Basal Area per Acre <sup>1</sup>	Desired Conifer Basal Area per Acre
1	MHW	12	36	112	51 <sup>4</sup>	50 (EPN)- 75 (SMC)
	EPN	5				
	SMC	19				
2	MHW	2	76	90	75	75 (SMC)
	SMC	74				

Treatment Unit	CWHR Class <sup>3</sup>	Acres per CWHR Class	Total acres per unit <sup>1</sup>	Estimate d Conifer Trees per Acre	Estimate d Conifer Basal Area per Acre <sup>1</sup>	Desired Conifer Basal Area per Acre
<b>3</b>	Barren	4	262	138	85	50 (EPN)- 75 (SMC)
	MCH	14				
	MHW	15				
	MHC	2				
	EPN	128				
	SMC	99				
<b>4</b>	SGB	2	52	163	90	50 (EPN)
	MRI	3				
	MHC	3				
	EPN	44				
<b>5</b>	Barren	20	1,085	95	61	50 (EPN)- 75 (SMC)
	PGS	13				
	MCP	79				
	MHW	3				
	MCH	2				
	MHC	457				
	EPN	476				
	SMC	35				
<b>6<sup>2</sup></b>	PGS	4	623	2		50 (EPN)- 75 (SMC)
	MCP	52				
	MCH	23				

Treatment Unit	CWHR Class <sup>3</sup>	Acres per CWHR Class	Total acres per unit <sup>1</sup>	Estimate d Conifer Trees per Acre	Estimate d Conifer Basal Area per Acre <sup>1</sup>	Desired Conifer Basal Area per Acre
	MHW	351				
	MHC	150				
	EPN	3				
	SMC	40				
<b>7<sup>5</sup></b>	MCH	4	206	143	98	50 (EPN)- 75 (SMC)
	MCP	3				
	MHW	73				
	MHC	53				
	EPN	44				
	SMC	29				
<b>10</b>	MCP	29	303	98	61	50 (EPN)- 75 (SMC)
	MHW	91				
	MHC	13				
	EPN	20				
	SMC	150				
<b>TOTAL</b>		2,646	2,646			

1 Estimated Values are from Forest Vegetation Simulator and 2017 Common Stand Exams.

2 Common Stand Exams were not conducted in Unit 6 because of the mostly non-timbered vegetation type

3 Guide to the California Wildlife Habitat Relationships System- State of California Department of Fish and Game-1988

4The 51 feet of basal area per acre in Unit 1 does not reflect the actual on ground situation because the 12 acres of MHW were averaged in the calculations. This averaging may be true for all units.

5 Units 8 and 9 were removed from the project area during initial project planning

Table 5: CWHR Type, Treatment Type and Acreage per Type

CWHR Type, Size Class and Canopy Closure	Acres
<b>No Proposed Treatment</b>	
Barren	25
Perennial grasslands (PGS)	17
Sagebrush (SGB)	2
Total	44
<b>Brush Dominated Stands</b>	
Mixed Chaparral (MCH)	43
Montane Chaparral (MCP)	164
Total	207
<b>Oak Woodlands Stands</b>	
Montane Riparian (MRI)	4
Montane Hardwood (MHW)	547
Total	551
<b>Conifer/ Forest Stands</b>	
Montane Hardwood-Conifer (MHC)	679
Sierra Mixed Conifer- (SMC)	260
Eastside Pine (EPN)	905
Total	1,844

### Proposed Action

The proposed action was developed based on purpose and need using vegetation and fuel loading data collected for the project. A total of 2,646 acres are proposed for one or more treatment. The project is designed to remove dead and dying trees that are stressed from years of drought, insects, and mistletoe infestations, and to thin areas



where the trees are clumped to increase the distance between crowns and increase individual tree vigor, while retaining some clumps for terrestrial habitats. Fuel loading would be reduced to increase resilience to wildfire, and when feasible, fire would be re-introducing into a fire adapted ecosystem.

The following activities are being proposed: harvesting merchantable and non-merchantable trees; treating surface and ladder fuels, enhancing oaks woodlands, and maintaining and repairing existing roads. Mechanical harvesting is proposed throughout the Crossroads Project area. Where mechanical harvesting cannot be used (i.e. steep slopes, rocky, or other inoperable areas) hand thinning treatments may be used.

## Forest Stand Treatments

Forest Stand Treatments would occur on approximately 1,844 acres in the SMC, EPN and MHC timber stands.

The Sanitation-Salvage prescription would be used to remove dead and dying trees that are stressed from years of drought, insects, root disease, and mistletoe infestations.

1. Trees to be removed would be determined by:
  - a. The California Pine Risk-Rating System, Smith et al. USDA. FS, General Technical Report, WO-27 (1981).
  - b. The Ten-Year Risk Rating Systems for California Red Fir and White Fir, Ferrell, USDA, FS, General Technical Report, PSW-115 (1989).
  - c. The 6-class dwarf mistletoe rating system, Hawksworth, Frank G. 1977. USDA For. Serv. Gen. Tech. Rep RM-48, 7p. Rocky Mt. For. and range Exp. Stn., Fort Collins, Colo. 80521.
2. Tree that are considered a safety hazard, particularly along roads, trails, and high use areas would be removed.
3. Trees may need to be removed individually, as insect or drought killed, or in small groups, as in mistletoe or root rot centers. There are no basal area/acre standards for Sanitation-Salvage.

The thinning prescription would be used in areas where the trees are densely clumped to increase the distance between crowns and increase individual tree vigor. Fifteen percent of the area would be retained in clumps for terrestrial habitats.

1. EPN stands would be thinned to a residual 50 square feet of basal area per acre and would retain the larger healthy diameter trees to promote an uneven-aged old growth forest.

2. SMC stands would be thinned to a residual 75 square feet of basal area per acre and would retain the larger healthy diameter trees to promote an uneven-aged old growth forest.

The silvicultural prescriptions would retain a mixture of species, sizes and age classes to create a heterogeneous stand. Treatment designs for conifer stands were developed using the GTR 220 (North et al 2009) concepts. Tree spacing would be highly variable, creating diverse stand conditions characterized by individual trees, clumps, and openings.

The Interagency Scientific Committee's report recommended that forested federal lands between designated Habitat Conservation Areas (HRA) be managed at 50 percent of every quarter Township to have forest stands that have an average dbh of 11 inches and at least 40 percent canopy closure. This commonly referred to as the 50-11-40-rule.

As per NWFP requirements, 15 percent of the area would be retained in green trees and snags. As a general guide, 70 percent of the total retained area should be aggregates of moderate to larger size, (0.2 to 1 hectare or more), with the remainder as dispersed structures (individual trees, and if possible including clumps less than 0.2 hectares). To the extent possible, patches and dispersed retention should include the largest, oldest live trees, decadent or leaning trees, and hard snags occurring in the unit. Within the retention areas, hand thinning may occur to reduce fuels.

## Oak Woodland Stand Treatments

Approximately 551 acres of Montane Hardwoods (MHW) and Montane Hardwood-Conifer (MHC) stands would be treated to enhance growing conditions for older Oregon white and California black oaks through radial thinning. Competing conifers would be removed around oaks to enhance the growing environment for these hardwoods. Generally, this treatment would consist of the mechanical removal of all trees within 40 feet of such oaks. Unique conifer trees, such as those exhibiting desirable wildlife characteristics, or large diameter conifers would generally be retained.

The California black oak component would be thinned using a double the diameter rule (e.g. a 10-inch diameter oak would have all vegetation removed for 20 feet from the tree).

The Oregon white oak component (which usually grows in clumps of 3-10 stems) would use the double the canopy rule (e.g. the canopy diameter is 12 feet and would have all vegetation removed for 24 feet around the clump).

## Brush Dominated Stand Treatments

Brush dominated WHR classes (MCH and MCP) occupy 207 acres within the Crossroads Project. The brush component would be reduced using the double the canopy rule to increase available soil moisture levels within the woodlands. Brush removal would use the double the canopy rule (e.g. the canopy diameter is 10 feet and would have all vegetation removed for 20 feet around the clump). This treatment would reduce fuel levels and regenerate manzanita and ceanothus for wildlife habitat.

## Riparian Reserve Treatments

Each riparian reserves treatment would occur on approximately 64 acres. Each Riparian Reserve area has site specific treatments which are briefly described below.

### *Fish Bearing Streams*

Burney Creek flows through two of the Crossroads treatments unit, Units 3 and 4. The riparian reserve areas for the these units shall be considered the stream channel and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream channel), whichever is greatest.

**Unit 3** would have a 300 foot or to western edge of State Highway 89 Equipment Exclusion Zone (EEZ). Within this riparian reserve area, hazard trees that could fall into Highway would be removed. In order to reduce the existing heavy fuel loads in this area, some conifer snags would be removed. On the east side of Burney Creek, in the inner riparian reserve area (100 feet from the stream channel) 3.5 snags greater than 15" in diameter at breast height (DBH) per acre would be retained, and within the outer riparian reserve area (greater than 100 feet from the channel), 0-2 snags per acre would be retained. On the west side of Burney Creek 3.5 snags greater than 15" in diameter per acre would be retained. Additionally, the entire riparian reserve area may be hand thinned and piled to reduce hardwoods and brush by approximately 50 percent. Piles would be placed at least 50 feet from the bank full edge of the channel.

**Unit 4** would have a 300-foot riparian reserve treatment area. The inner riparian reserve (100 feet from the stream channel) shall have an EEZ where only sanitation salvage would occur. Within the inner zone, equipment may reach in and remove trees, trees would also be hand felled and end-lined out of the inner riparian reserve. Three and one-half snags (>15" DBH) /acre in the inner riparian zone would be retained. Additionally, the inner riparian reserve area may be hand thinned and piled

to reduce hardwoods and brush by approximately 50 percent. Piles would be placed at least 50 feet from the bank full edge of the channel. Within the outer riparian reserve (greater than 100 feet from the channel), the forest stand would be thinned to EPN standards described below. Hardwoods and brush may be reduced by 50 percent and machines would be used to create piles to be burned.

#### *Seasonally Flowing or Intermittent Streams*

There are three seasonally flowing or intermittent streams within the Crossroads Project area located within Units 6 and 7. The riparian reserves for these areas shall be considered the stream channel and extend to the top of the inner gorge, the stream channel or wetland and the area from the edges of the stream channel or wetland to the outer edges of the riparian vegetation, and extension from the edges of the stream channel to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest.

**Unit 6** would have a 100-foot riparian reserve treatment area. The inner riparian reserve (50 feet from the stream channel) shall have an EEZ where only sanitation salvage may occur. Within the inner zone, equipment may reach in and remove trees, or trees would be hand felled and end-lined out of the inner riparian reserve. Three and one-half snags (>15" DBH)/acre in the entire riparian zone would be retained. Additionally, the inner riparian reserve area may be hand thinned and piled to reduce hardwoods and brush by approximately 50 percent. Piles would be placed at least 25 feet from the bank full edge of the channel. Within the outer riparian reserve (greater than 50 feet from the channel), the forest stand would be thinned to SMC standards described below. Hardwoods and brush may be reduced by 50 percent and machines would be used to create piles to be burned.

**Unit 7** would have a 100-foot riparian reserve treatment area. The inner riparian reserve (50 feet from the stream channel) shall have an EEZ where only sanitation salvage may occur. Within the inner zone, equipment may reach in and remove trees, or trees would be hand felled and end-lined out of the inner riparian reserve. Three and one-half snags (>15" DBH)/acre in the entire riparian zone would be retained except where the riparian reserve is within 200 feet from a permanent road. In which case, 0-2 snags per acre would be retained. Additionally, the inner riparian reserve area may be hand thinned and piled to reduce hardwoods and brush by approximately 50 percent. Piles would be placed at least 25 feet from the bank full edge of the channel. Within the outer riparian reserve (greater than 50 feet from the channel), the forest stand would be thinned to EPN standards described below. Hardwoods and brush may be reduced by 50 percent and machines would be used to create piles to be burned.

### *Wetlands Less than One Acre*

No wetlands less than one acre have been identified during project planning, however, if they are identified during field layout, the riparian reserves for these areas shall be considered the outer edges of the riparian vegetation. If found, they would be flagged around the outer edges of the riparian vegetation and protected.

*Table 6: Treatments by unit, CWHR class and acreage.*

<b>Treatment Unit</b>	<b>CWHR Class</b>	<b>Acres per CWHR Class</b>	<b>Treatments</b>
<b>1</b>	<b>Oak Woodland Stands</b>		
	MHW	12	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	<b>Forest Stands</b>		
	EPN	5	Sanitation-Salvage and Thin to 50 sq. ft basal area/acre. If stand does not have 50 sq. ft basal area/acre do not thin. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	SMC	2	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	SMC with DEIN (Olive-thorn Lichen)	17	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Retain all oaks during mechanical or hand thinning treatments. Thin occupied habitat only if conifer encroachment threatens the persistence of oaks, and then only in areas where large conifers would provide adequate shading to maintain microclimate. Retain larger overstory trees but thin smaller fuels in occupied stands. Do not radial thin around oaks.

Treatment Unit	CWHR Class	Acres per CWHR Class	Treatments
2	Oak Woodland Stands		
	MHW	2	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	Forest Stands		
	SMC with DEIN (Rare Olive-thorn Lichen)	74	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Retain all oaks during mechanical or hand thinning treatments. Thin occupied habitat only if conifer encroachment threatens the persistence of oaks, and then only in areas where large conifers would provide adequate shading to maintain microclimate. Retain larger overstory trees but thin smaller fuels in occupied stands. Do not radial thin around oaks.
3	No Proposed Treatments		
	Barren	3	No treatments
	AGS	1	
	Brush Dominated Stands		
	MCH	14	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	Oak Woodland Stands		
	MHW	15	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	Forest Stands		



Treatment Unit	CWHR Class	Acres per CWHR Class	Treatments
	MHC	2	Sanitation-Salvage the conifers. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	EPN	128	Sanitation-Salvage and thin to 50 sq. ft basal area/acre. If stand does not have 50 sq. ft basal area/acre do not thin. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	SMC	99	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	<b>Riparian Reserve</b>		
	Riparian Reserve		Burney Creek -300-foot Equipment Exclusion Zone (EEZ) or to western edge of State Highway 89. Remove hazard trees that could fall into the highway. Reduce fuels -remove conifer snags but retain 3.5 snags (>15")/acre in the inner 100 feet buffer and 0-2 snags (>15")/acre in the outer 200 feet of riparian reserve on the east side of Burney Creek. The west side of Burney Creek retain 3.5 snags (> 15")/acre. Reduce hardwoods and brush by 50 percent. Hand treat and pile. Place piles at least 50 feet from bank full edge of creek.
<b>4</b>	<b>No Proposed Treatment</b>		
	SGB	2	No treatment

Treatment Unit	CWHR Class	Acres per CWHR Class	Treatments
	Forest Stands		
	MHC	3	Sanitation-Salvage the conifers. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	EPN	44	Sanitation-Salvage and Thin to 50 sq. ft basal area/acre. If stand does not have 50 sq. ft basal area/acre do not thin. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	Riparian Reserve		
	Riparian Reserve		100-foot EEZ. Sanitation-Salvage only in the EEZ. Operators may reach in and remove whole trees. Remove conifer snags but retain 3.5 snags (> 15")/acre in the inner 100 feet. Reduce hardwoods and brush by 50 percent. Hand treat and pile. Place piles at least 50 feet from bank full edge of creek within the inner 100 feet. 101-300 feet- Reduce fuels (remove conifer snags to 0-2 snags/acre within 200 feet of roads. Thin to EPN standards. Reduce hardwoods and brush by 50 percent. Machine pile.
5	No Proposed Treatment		
	Barren	20	No Treatment
	PGS	13	
	Brush Dominated Stands		
	MCP	79	

Treatment Unit	CWHR Class	Acres per CWHR Class	Treatments
	MCH	2	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	<b>Oak Woodland Stands</b>		
	MHW	3	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	<b>Forest Stands</b>		
	MHC	457	Sanitation-Salvage the conifers. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	EPN	476	Sanitation-Salvage and Thin to 50 sq. ft basal area/acre. If stand does not have 50 sq. ft basal area/acre do not thin. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	SMC	35	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
6	<b>No Proposed Treatments</b>		
	PGS	4	No Treatment
	<b>Brush Dominated Stands</b>		
	MCP	52	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	MCH	23	

Treatment Unit	CWHR Class	Acres per CWHR Class	Treatments
	<b>Oak Woodland Stands</b>		
	MHW	351	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	<b>Forest Stands</b>		
	MHC	150	Sanitation-Salvage the conifers. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	EPN	3	Sanitation-Salvage and Thin to 50 sq. ft basal area/acre. If stand does not have 50 sq. ft basal area/acre do not thin. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	SMC	40	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	<b>Riparian Reserve</b>		
	Riparian Reserve	9	50-foot EEZ. Sanitation-Salvage only in the EEZ. Operators may reach in and remove whole trees. Remove conifer snags but retain 3.5 snags (> 15")/acre in the 100 feet RR. Reduce hardwoods and brush by 50 percent. Hand treat and pile. Place piles at least 25 feet from bank full edge of creek. 51-100 feet- Thin to SMC standards. Reduce hardwoods and brush by 50 percent. Machine pile

Treatment Unit	CWHR Class	Acres per CWHR Class	Treatments
7	Brush Dominated Stands		
	MCH	4	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	MCP	3	
	Oak Woodland Stands		
	MHW	73	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	Forest Stands		
	MHC	53	Sanitation-Salvage the conifers. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	EPN	44	Sanitation-Salvage and Thin to 50 sq. ft basal area/acre. If stand does not have 50 sq. ft basal area/acre do not thin. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	SMC	29	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	Riparian Reserve		
	Riparian Reserve	11	50-foot EEZ. Sanitation-Salvage only in the EEZ. Operators may reach in and remove whole trees. Remove conifer snags but retain 3.5 snags (> 15")/acre if RR is farther than 200 feet from a road. Retain 0-2 snags (>15")/acre if RR is within 200

Treatment Unit	CWHR Class	Acres per CWHR Class	Treatments
			feet of a road. Reduce hardwoods and brush by 50 percent. Hand treat and pile within the inner 50 feet of creek. Place piles at least 25 feet from bank full edge of creek. 51-100 feet- Thin to EPN standards. Reduce hardwoods and brush by 50 percent. Machine pile.
10	<b>Brush Dominated Stands</b>		
	MCP	29	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	<b>Oak Woodland Stands</b>		
	MHW	91	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	<b>Forest Stands</b>		
	MHC	13	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	EPN	20	Sanitation-Salvage and Thin to 50 sq. ft basal area/acre. If stand does not have 50 sq. ft basal area/acre do not thin. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	SMC	137	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	SMC with	13	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Retain all oaks during mechanical or



Treatment Unit	CWHR Class	Acres per CWHR Class	Treatments
	DEIN (Rare Olive-thorn Lichen)		hand thinning treatments. Thin occupied habitat only if conifer encroachment threatens the persistence of oaks, and then only in areas where large conifers would provide adequate shading to maintain microclimate. Retain larger overstory trees but thin smaller fuels in occupied stands. Do not radial thin around oaks.

## Fuels Treatment

Fuels treatment may occur on all 2,646 acres and would use one of or a combination of the following treatments: biomass, mastication, hand thinning, underburning, and pile burning. Fuels treatment goals include reducing surface fuels, removing ladder fuels, increasing canopy base heights, and disrupting canopy fuels. Fuels treatments would transition vegetation from a condition class 3 towards a condition class 2 with the long-term goal of achieving a condition class 1, and would focus on reducing fuels along property boundaries, ridgelines, and roads to improve safety used as ingress and egress routes. Fuel reduction goals include reducing surface fuel by approximately 50 percent. Post treatment, the forest environment would burn at lower intensities and fire firefighting production rates would be increased because less surface fuels and small diameter trees would need to be cleared for fireline construction or backfiring.

Surface, ladder, and canopy fuels would be treated across the entire project area using a combination of vegetation treatments: biomassing removal, mastication, hand thinning, and prescribed fire treatments (underburning, and pile burning) designed to meet the desired conditions.

Biomass chipping is where non-merchantable material and the small diameter trees (10-inch dbh or less) are removed to reduce fuels. No machinery associated with biomass would operate on slopes exceeding 35 percent; however, where feasible, the equipment may reach into these areas to remove such material.

Mastication is the process of mulching vegetation with machinery by grinding, shredding, or chopping noncommercial sized trees or shrubs (up to 10 inches in dbh) into small chunks or pieces. Mastication treatments are designed to encourage the break-up of fuel continuity that has accumulated to historically uncharacteristic levels. Site specific prescriptions would reduce current stocking levels and remove ladder fuels,

decrease brush cover, and concentrate on residual spacing. No machinery associated with mastication would travel on slopes exceeding 35 percent; however, masticator heads may reach into these areas (e.g. use of excavator arm). Mastication would prioritize the removal of ladder fuels, reduce the hazardous accumulations of decadent brush and areas of heavy surface fuels.

Hand thinning treatment would consist of hand thinning conifers and shrubs and piling existing and activity generated surface fuels. Approximately 90-95 percent of trees five inches diameter at breast height (DBH) and less and approximately 30-40 percent of the shrubs within a treatment unit may be cut, with an emphasis on removing trees and shrubs that act as a ladder fuels to the stand. The residual conifers within these stands may be pruned to increase the canopy base height to 5-6 feet. The cut material from the pruning would be hand piled and burned, or mechanically chipped. All piles would be constructed away from the boles and outside the drip line of the leave trees.

Underburning, or pile burning would generally occur after a thinning or vegetation treatment has occurred. Underburning would be used to consume forest litter and slash from thinning and vegetation treatments. This treatment type mimics the low and mixed fire intensities that would occur naturally in these forest types. Natural and existing man-made fire barriers such as roads, skid trails, and wet drainages would be used as fire line, where feasible. Where such barriers do not exist, firelines may be constructed by hand or machine.

## Transportation System

The existing transportation system would be used to provide access to treatment units. Road maintenance includes dust abatement, erosion controls, and maintenance; all of which would be implemented using best management practices. Where existing roads systems are not adequate to provide access to treatment areas, temporary roads may be constructed. Upon completion of use, temporary roads would be decommissioned. These temporary roads would be decommissioned by obliteration upon project completion.

*Table 7: Proposed Temporary Road Construction*

Unit Number	Approximate Road Length
5	0.25 miles
7	0.75 miles
10	0.25 miles

## Literature Cited

Cluck, D. and Woodruff, B. 2017. Evaluation of stand conditions within the Crossroads Project. FHP Report NE17-04.

LANDFIRE Existing Vegetation Type layer. (2013, June -last update). U.S. Department of Interior, Geological Survey. [2018, March 6]. [Online]. Available: <http://landfire.cr.usgs.gov/viewer/>

North, Malcolm; Stine, Peter; O'Hara, Kevin; Zielinski, William; Stephens, Scott. 2009. An Ecosystem Management Strategy for Sierran Mixed-Conifer Forests. Gen. Tech. Rep. PSW-GTR-220. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 49 p.

USDA. 1992. Lassen National Forest Land and Resource Management Plan- Record of Decision (1993) and Final Environmental Impact Statement (1992). San Francisco, CA: Pacific Southwest Region.

USDA. Northwest Forest Plan, ROD 1994. Document Library. Standards and Guidelines for Management of the Northern Spotted Owl. Available: <http://www.fs.fed.us/r6/reo/library/documents.html>

USDA. 2012. National Best Management Practices for Water Quality Management on National Forest System Lands

Calfire FRAP-The Wildland Urban Interface (WUI): Assessing the wildfire related risks to people, property and infrastructure in California. Available: [www.frap.fire.ca.gov/frap](http://www.frap.fire.ca.gov/frap)

State of California, Department of Fish and Game- Guide to the California Wildlife Habitat Relationships System- 1988

Ganda and PG&E-Interagency Bald Eagle Management Planning- Pit 3.4.and 5 Project- FERC No. 233- Amended 7-31-2015

US Fish and Wildlife Service- National Bald Eagle Guidelines- May 2007

Smith, Wickman, Hall, DeMars, and Ferrell, 1981.The California Pine Risk Rating System, General Technical Report WO-27, US. Department of Agriculture, Forest Service 17 p.

Ferrell, 1989. Ten Year Risk Rating Systems for California Red Fir and White Fir: Development and Use. General Technical Report PSW-115, US. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 13 p.

Dunning, 1928. A Tree Classification for the Selection Forests of the Sierra Nevada. Journal of Agricultural Research, Washington D.C. Vol.36, No 9.

Hawksworth, Frank G. 1977. The 6-class dwarf mistletoe rating system. USDA For. Serv. Gen. Tech. Rep RM-48, 7p. Rocky Mt. For. And range Exp. Stn., Fort Collins, Colo. 80521.

Cohen, Jack D. 1999. Reducing the wildland fire threat to homes: Where and how much? In: Gonzales-Caban, Armando; Omi, Philip N., technical coordinators. Proceedings of the Symposium on Fire Economics, Planning, and Policy: Bottom Lines; 1999 April 5-9. San Diego, CA. Gen. Tech. Rep. PSW-GTR-173. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. p. 189-19510p.

Cohen, Jack. 2008. The wildland-urban interface fire problem: A consequence of the fire exclusion paradigm. Forest History Today. Fall: 20-26.

## Appendix A: Integrated Design Features

## Integrated Design Features

The following integrated design features are resource protection measures that are developed by specialists to reduce or eliminate any unwanted environmental effects. They are project specific and incorporated as part of the proposed action in addition to best management practices (BMPs). Integrated design features ensure the project is consistent with NWFP and the Lassen National Forest Land and Resource Management Plan standards and guidelines as well as other laws, regulations, and policies. These integrated design features would be incorporated into treatments and contracts or guide Forest Service personnel in conducting implementation.

## Botany

Threatened, Endangered, Forest Service Sensitive and Special Interest Plant Species:

1. Protect all occurrences of ephemeral monkeyflower (*Erythranthe inflatula*) from project activities through flag and avoid methods and displayed as control areas on contract maps.
2. Vernal wet drainages associated with Bellinger's meadowfoam (*Limnanthes floccosa* ssp. *bellingeriana*) in Unit 7 would be flagged and avoided by ground disturbing activities. Hand thinning is allowed but all piles must be placed at least 25 feet from this area and underburning would only occur in the spring with these areas are wet.
3. All live juniper trees greater than or equal to 20 inches d.b.h. with low, sweeping branches and mossy understory would be retained. During underburning operations, no ignition would occur within 100 feet of these trees. Hand piles would not be placed within 25 feet of these trees.
4. All vernal pools would be flagged and avoided by all ground disturbing activities and displayed as control areas on contract maps.
5. Prescribed fire operations adjacent to occupied vernal pools would only occur in the spring when Burney Creek is flowing. Fire would not be allowed within the floodplain. If firelines are necessary, they would be located at a minimum of 300 feet from Burney Creek.
6. Only hand treatment methods would be allowed within 300 feet along the west side of Burney Creek in Unit 10. Trees would be removed and piled outside of this area.
7. All known occurrences of Bidwell's knotweed (*Polygonum bidwelliae*), silvery false-lupine (*Thermopsis californica* var. *argentata*) and awl-leaved navarretia (*Navarrettia sublingera*), would be protected from project activities through flag and avoid methods and control areas displayed on contract maps.



8. Within vernal pool, hand treatment units all trees would be directionally felled away from the pools.
9. Slender Orchid grass surveys shall occur and if present shall receive protection measures as determined by the Lassen National Forest botanist.
10. In Units 1, 2 and 10 where olive-thorn lichen (*Dendroica caulon intricatum*) occurs the following management recommendations would occur:
11. Protect and retain all oak trees with known DEIN occurrences units.
12. No radial thinning would occur.
13. Maintain microclimate around occupied trees (consider canopy cover, moisture, understory vegetation).
14. Where the lichens occurs, large-diameter conifers (pine, fir, cedar) are providing enough shade to maintain a moist microclimate for the lichens, while also leaving enough canopy gaps that oak trees have adequate light.
15. Manage for oak to provide additional substrates for colonization
16. Thin occupied habitat only if conifer encroachment threatens the persistence of oaks, and then only in areas where large conifers would provide adequate shading to maintain microclimate.
17. Buffer occupied trees from radiant heat or smoke from broadcast or pile burning.
18. Protect from radiant heat or smoke from broadcast or pile burning. Piles would be placed at a minimum of 25 feet buffer from oaks trees where practicable.
19. Avoid mechanical damage to occupied trees as well as fire-induced mortality or smoke damage
20. New occurrences of threatened, endangered or sensitive plant or and species on the survey and manage list in Categories A- E discovered before or during ground-disturbing activities would be protected through flag-and-avoid methods.

#### Invasive Plant Species:

1. All off-road equipment would be weed-free prior to entering the Forest. Staging of equipment would be done in weed-free areas.
2. Known invasive plant infestations would be identified, flagged where possible, and mapped for this project. Locations would be displayed on contract maps. Identified invasive plant sites within or adjacent to the project area containing isolated patches with small plant numbers would be treated (hand pulled or dug)

by forest botany staff or designated project partners prior to project implementation and avoided. Any larger or non-pull able infestations would be avoided by harvesting equipment, or equipment used would be washed on site before leaving the infested area and entering un-infested areas to prevent spreading invasive plants across the project area.

3. New small infestations identified during project implementation would be evaluated and treated according to the species present and project constraints and avoided by project activities. If larger infestations are identified, they would be isolated and avoided by equipment, or equipment used would be washed after leaving the infested area and before entering an un-infested area.
4. Post-project monitoring for implementation and effectiveness of weed treatments and control of new infestations would be conducted as soon as possible and for a period of multiple years after completion of the project.
5. If approved project implementation calls for mulches or fill, they would be certified weed-free.
6. Seed mixes used for revegetation of disturbed sites would consist of locally adapted native plant materials to the extent practicable.
7. If possible, place burn piles on top of known invasive plant occurrences when hand thinning.

## Cultural Resources

Cultural Resource integrated design features would conform to standard mitigations from Programmatic Agreement (PA) among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), California State Historic Preservation Officer, Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Processes for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forests of the Pacific Southwest Region – Amendment #1 (2018; PA). If these are determined to not be adequate for protection of historic properties, the Lassen would consult with the California Office of Historic Preservation under the provisions of the PA.

### Standard Mitigation Class I: Avoidance

1. Heritage Program Manager (HPM) / District Heritage Program Specialist (DHPS) shall exclude historic properties from areas where activities associated with undertakings would occur, except where authorized below.
2. Proposed undertakings shall avoid historic properties. Avoidance means that no activities associated with undertakings that may affect historic properties, unless

specifically identified in this PA, shall occur within historic property boundaries, including any defined buffer zones (see clause 1.1(a), below). Portions of undertakings may need to be modified, redesigned, or eliminated to properly avoid historic properties.

- a. Buffer zones may be established to ensure added protection where HPM/DHPS determine that they are necessary. The use of buffer zones in avoidance measures may be applicable where setting contributes to property eligibility under 36 CFR 60.4, or where setting may be an important attribute of some types of historic properties (e.g., historic buildings or structures with associated historic landscapes, or traditional cultural properties important to Indians), or where heavy equipment is used in proximity to historic properties.
  - b. The size of buffer zones must be determined by HPMs or qualified Heritage Program staff on case-by-case bases.
3. Activities within historic property boundaries would be prohibited with the exception of using developed Forest transportation systems when the HPM or qualified heritage professional recommends that such use is consistent with the terms and purposes of this agreement, where limited activities approved by the HPM or qualified heritage professional would not have an adverse effect on historic properties, or except as specified below in section 2.0.
4. All historic properties within areas of potential effect (APEs) shall be clearly delineated prior to implementing any associated activities that have the potential to affect historic properties.
  - a. Historic property boundaries shall be delineated with coded flagging and/or other effective marking.
  - b. Historic property location and boundary marking information shall be conveyed to appropriate Forest Service administrators or employees responsible for project implementation so that pertinent information can be incorporated into planning and implementation documents, contracts, and permits (e.g., clauses or stipulations in permits or contracts as needed).
5. When any changes in proposed activities are necessary to avoid historic properties (e.g., project modifications, redesign, or elimination; removing old or confusing project markings or engineering stakes within site boundaries; or revising maps or changing specifications), these changes shall be completed prior to initiating any project activities.

6. Monitoring by heritage program specialists may be used to enhance the effectiveness of protection measures. The results of any monitoring inspections shall be documented in cultural resources reports and the Infra database.
7. In the event that either cultural resources are discovered, or historic properties are inadvertently affected, during implementation of this undertaking, all work shall stop until the situation can be assessed by a qualified archaeologist and reported to the Heritage Program Manager or assessed by the Heritage Program Manager. The Forest would submit written notification describing the circumstances of the discovery to the Regional Heritage Program Leader and State Historic Preservation Officer within two working days (e.g., letter or email notification). Forests would provide written reports describing the status or resolution of the discovery/inadvertent effect every six months until it is resolved (Section 7.10 Discoveries and Inadvertent Effects, (a) USFS 2018).
8. Should inadvertent effects to or unanticipated discoveries of human remains be made during this undertaking, the County Coroner (California Health and Safety Code 7050.5(b)) or Sheriff if ex officio Coroner (Nevada Revised Statutes 259) shall be notified immediately. If the remains are determined to be Native American or if Native American (Indian) cultural items pursuant to the Native American Graves Protection and Repatriation Act are uncovered, the provisions of the Native American Graves Protection and Repatriation Act and its regulations at 43 CFR 10 and ARPA at 43 CFR 7 shall be followed on federal lands. (Section 7.9 Human Remains, (a) USFS 2018).

#### Class II: On-Site Historic Property Protection Measures

1. HPM/DHPS may provide written approval for an undertaking's activities within or adjacent to the boundaries of historic properties based on professional judgment that such activities would not have an adverse effect on historic properties, or under carefully controlled conditions such as those specified below. All activities performed under Section 2.0 (Standard Protection Measures) must be documented in inventory or other Heritage Program Reports (HPMs), or other compliance reports prepared pursuant to this PA.
2. The following historic property protection measures may be approved for undertakings under the conditions detailed below:
  - a. Linear sites (e.g., historic trails, roads, railroad grades, ditches) may be crossed or breached by equipment in areas where their features or characteristics clearly lack historic integrity (i.e., where those portions do not contribute to site eligibility or values).

- b. Crossings are not to be made at the points of origin, intersection, or terminus of linear site features.
- c. Crossings are to be made perpendicular to linear site features.
- d. The number of crossings is to be minimized by project and amongst multiple projects in the same general location.
- e. The remainder of the linear site is to be avoided, and traffic is to be clearly routed through designated crossings.
- f. Accumulation of sufficient snow over archaeological deposits or historic features to prevent surface and subsurface impacts. Undertaking activities may be implemented over snow cover on historic properties under the following conditions:
  - g. The cover must have at least 12 inches depth of compacted snow or ice throughout the duration of undertaking activities on sites.
  - h. All concentrated work areas (e.g., landings, skid trails, turnarounds, and processing equipment sites) shall be located prior to snow accumulation and outside historic property boundaries.
  - i. Placement of foreign, non-archaeological material (e.g., padding or filter cloth) within transportation corridors (e.g., designated roads or trails, campground loops, boat ramps, etc.) over archaeological deposits or historic features to prevent surface and subsurface impacts caused by vehicles or equipment. Such foreign material may be utilized on historic properties under the following conditions:
    - i. Engineering would design the foreign material depth to acceptable professional standards;
    - ii. Engineering would design the foreign material use to assure that there would be no surface or subsurface impacts to archaeological deposits or historic features;
    - iii. The foreign material must be easily distinguished from underlying archaeological deposits or historic features;
    - iv. The remainder of the archaeological site or historic feature is to be avoided, and traffic is to be clearly routed across the foreign fill material;

- v. The foreign material must be removable should research or other heritage need require access to the archaeological deposit or historic feature at a later date; and
    - vi. Indian tribe or other public concerns about the use of the foreign material would be addressed prior to use.
  - j. Placement of barriers within or adjacent to site boundaries to prevent access to or disturbance of deposits or historic features, or for protection of other sensitive resources on-site, when such barriers do not disturb subsurface deposits or lead to other effects to the site.
    - i. Non-intrusive barriers: wooden and other barriers anchored with rebar; rocks/boulders or other items placed on the surface; weed-free straw bales or straw bales anchored with rebar; or other nonintrusive barriers approved by HPMs or qualified Heritage Program staff.
    - ii. Fencing: "T"-post fencing; snow fencing; orange highway-type fencing; or other fencing approved by HPMs or qualified Heritage Program staff.
  - k. Installation or placement of erosion control devices, ditches, features or other treatments within site boundaries when such measures are reviewed by the HPM/DHPS and hydrologist or soil scientist, and HPM approves their use as unlikely to affect the integrity of a historic property.
3. The following activity-specific standard protection measures may be approved by HPM/DHPS under the conditions specified below:
- i. Felling and removal of hazard, salvage, and other trees within historic properties under the following conditions:
  - ii. Trees may be limbed or topped to prevent soil gouging during felling;
  - iii. Felled trees may be removed using only the following techniques: hand bucking, including use of chain saws, and hand carrying, rubber-tired loader, crane/self-loader, helicopter, or other non-disturbing, HPM-approved methods;
  - iv. Equipment operators shall be briefed on the need to reduce ground disturbances (e.g., minimizing turns);

- v. No skidding nor tracked equipment shall be allowed within historic property boundaries; and
- b. Where monitoring is a condition of approval, its requirements or scheduling procedures should be included in the written approval.
- c. For fire, and hazardous fuels and vegetation management projects, HPM/DHPS, in conjunction with fuels, vegetation management, or fire specialists as necessary, shall develop treatment measures for at risk historic properties (as defined in SHPO approved Region 5 modules and agreements) designed to eliminate or reduce potential adverse effects to the extent practicable by utilizing methods that minimize surface disturbance, and/or by planning project activities in previously disturbed areas or areas lacking cultural features.
- d. The following standard protection measures apply to fire, hazardous fuels, and vegetation management projects:
  - i. Fire crews may monitor sites to provide protection as needed.
  - ii. Fire lines or breaks may be constructed off sites to protect *at risk* historic properties.
  - iii. Vegetation may be removed, and fire lines or breaks may be constructed within sites using hand tools, so long as ground disturbance is minimized, and features are avoided, as specified by HPMs or qualified Heritage Program staff during fire emergencies (see Stipulation 7.11).
  - iv. Surface fuels (e.g., stumps or partially buried logs) on at risk historic properties may be covered with dirt, fire shelter fabric, foam or other wetting agents, or other protective materials to prevent fire from burning into subsurface components and to reduce the duration of heating underneath or near heavy fuels.
  - v. Trees that may impact *at risk* historic properties should they fall on site features and smolder can be directionally felled away from properties prior to ignition or prevented from burning by wrapping in fire shelter fabric or treating with fire retardant or wetting agents.
  - vi. Vegetation to be burned shall not be piled within the boundaries of historic properties unless locations (e.g., a previously disturbed area) have been specifically approved by HPMs or qualified Heritage Program staff.

- vii. Mechanically treated (crushed/cut) brush or downed woody material may be removed from historic properties by hand, through the use of off-site equipment, or by rubber-tired equipment approved by HPMs or qualified Heritage Program staff. Ground disturbance shall be minimized to the extent practicable during such removals.
    - viii. Woody material may be chipped within the boundaries of historic properties so long as the staging of chipping equipment on-site does not affect historic properties and staging areas are specifically approved by HPMs or qualified Heritage Program staff.
    - ix. HPMs shall approve the use of tracked equipment to remove brush or woody material from within specifically identified areas of site boundaries under prescribed measures designed to prevent or minimize effects. Vegetative or other protective padding may be used in conjunction with HPM authorization of certain equipment types within site boundaries.
  - e. HPMs or qualified Heritage Program staff shall determine whether fire, prescribed fire, or mechanical equipment treatments within site boundaries shall be monitored, and how such monitoring shall occur.
  - f. Use of any standard protection measures on historic properties for fire, hazardous fuels, and vegetation experimental mechanical treatments shall be documented in heritage program reports, detailing equipment type, extraction techniques, conditions of use, environmental conditions, project results, effectiveness of protection measures, need for changes, and recommendations for future use.
4. When any changes in proposed activities are necessary to avoid historic properties (e.g., project modifications, redesign, or elimination; removing old or confusing project markings or engineering stakes within site boundaries; or revising maps or changing specifications), these changes shall be completed prior to initiating any project activities. PA Appendix E section 1.4.
  5. If cultural resources are identified during project implementation (unanticipated discovery) all work would cease immediately in that area until the situation is reviewed and an assessment and mitigation plan instituted to insure protection of the site. PA section 7.10.



## Fire and Fuels/Air Quality

1. Minimize ground disturbance associated with fireline construction and where feasible, use existing firelines (i.e. roads, skid trails and natural barriers).
2. Burning shall be in accordance with Shasta County Air Resources Board regulations. Prescribed burns shall be conducted when conditions for smoke dispersal are favorable, especially away from homes, roads, and sensitive areas.

## Hydrology and Aquatics

1. Riparian Reserves (RR): identifies the waterbodies and features specific to the Crossroads Project Area and RR widths allocated along these areas in accordance with the 1994 Northwest Forest Plan. Silvicultural practices for Riparian Reserves would be applied to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives. (NWFP-Standards and Guidelines C-32).
2. All actions in riparian reserve areas would conform to the requirements of:
  - a. Northwest Forest Plan
  - b. Water Quality Management for Forest System Lands in California, Best Management Practices (2011)
  - c. Lassen National Forest Wet Weather Operations Guide
  - d. Lassen National Forest Wet Weather Haul Agreement
3. When operations occur within riparian reserve areas, the following integrated design features would be implemented: Soils must be dry at a depth of 10-inches before equipment could be operated on them.
4. Conifers would be harvested with a feller-buncher. Track widths would be 24-inches or greater.
5. To the extent practicable, logging equipment would utilize a straight in and straight out pattern, thereby minimizing the number of turns and associated disturbance.
6. Where extant, conifers necessary for stream bank stability would be retained.
7. Ground-based equipment would be prohibited in areas with slopes greater than 20 percent.
8. Crossings:

- a. When dry, seasonal channels and hydrologic depressions may be crossed with equipment at stable crossing points.
  - b. Vernal pools, wetlands (including wet meadows), springs, and lakes may not be crossed.
  - c. Crossings would be designated by agreement on the ground prior to implementation.
  - d. Skid trails and crossings would be perpendicular to the hydrologic feature.
  - e. Skid trails and crossings would be chosen to minimize the number of channel crossings and damage.
  - f. When items (d) and (e) cannot both be met, (e) takes precedence.
  - g. When loose soil that is likely to be displaced is present, erosion control measures, such as wattles, silt fences, or a functional equivalent would be deployed down channel from the crossing. When the need has passed, they and any captured materials would be removed.
  - h. Crossings would be restored when no longer needed for project operations.
9. Groundcover (including pre-existing rocks) would be kept at approximately 90 percent of existing. Excess project-generated debris (rocks, slash, etc.) would be removed unless considered desirable for landscape stability or habitat enhancement.
10. Pre-existing logging infrastructure on the landscape (i.e. temporary roads, equipment staging areas, and the outer 50 feet of landings) may be used by agreement with Forest Service personnel. This would only take place when sedimentation is mitigated by erosion prevention measures. In the case of landings, only the outer 50 feet could be used.
11. No new landings or temporary roads would be constructed.
12. Dust palliatives would not be used within 25 feet of hydrologic features and riparian vegetation.
13. Riparian species (alder, aspen, willows, etc.) would not be cut or removed, unless necessary for operability.
14. Large, downed wood in stream channels and hydrologic depressions would remain in place.

15. In areas proposed for piling and pile burning:
16. Fuels would be piled as far away from hydrologic features as practicable.
17. No pile ignitions would occur within the 50 feet of the watercourse channel.
18. Piles would be burned in the fall or winter to reduce the potential for soil damage.
19. Dozer-piling would be minimized. When practicable, other piling methods would be utilized.
20. When prescribed fire operations occur nearby, the fire could be backed in. No ignitions would take place.
21. Within Fish Bearing Stream's Riparian Reserves mechanical equipment would not enter the innermost 100 feet, unless it is within a designated crossing. Based upon the wet weather logging agreement, where compactable soils are present, the innermost 50 feet would not be entered. Reaching into these areas with equipment is permissible
22. No scarification or ripping of soils would occur.

## Range

1. Fences, spring developments, and cattle guards would be protected. If damaged during project activities, range improvements would be repaired prior to livestock entering the allotment or pasture. Project personnel would be responsible for coordination with range program personnel for completing repairs.

## Recreation and Visual Quality

1. Along recreation trails, such as the Pacific Crest National Scenic Trail (PCNST), and scenic roads, consider view sheds when selectively thinning trees.
  - a. Edges would be thinned in an intentional-appearing manner, for instance, by blending treatments to follow natural contours of the land.
  - b. An effort to protect clumps of large trees would be made both by retaining them during thinning and minimizing fire scarring during prescribed burning.
  - c. Vegetation diversity, including "trees with visually interesting characteristics" would be maintained.
2. Minimize slash piles near trails, viewpoints, and other high use areas.
3. Access to developed facilities would be maintained, when possible, during implementation. Where this is not possible by reason of safety, coordination

would occur with local Forest Service recreation personnel to provide this information to the public.

4. Protect all recreational signing, facilities, and improvements (i.e., fiberglass markers, roadside informational signs, kiosks, etc.) during implementation.
5. National Forest Transportation System (NFTS) trailheads and trails would be protected during operations and informational signs posted in advance of project implementation.
6. Residual green vegetation would be left adjacent to National Forest Transportation System trails when possible for visual quality. Dead, damaged, or structurally defective trees would be removed for pedestrian safety. When feasible, stumps would be flush cut or angled away from the trail.
7. Protect National Forest Transportation System trails and their associated prisms from damage during or as a result of treatment. No skidding would occur unless absolutely necessary. Crossings, when necessary, would be at 90 degrees. The trail and adjacent areas would be returned to pre-treatment conditions.
8. To minimize soil displacement, avoid turning equipment within 50 feet of National Forest Transportation System trails.
9. Maintain or restore National Forest Transportation System trails or trailhead improvements (i.e. trail alignment, tread, erosion control devices, etc.) to pre-treatment conditions.

## Silviculture

1. All cut stumps of live conifers (except Douglas-fir) with a 14-inch stump diameter and greater would be treated with an EPA- approved borate compound which is registered in California for the prevention of annosus root disease. (D. Cluck-Report NE17-04). No EPA-approved borate would be applied within 25 feet of known threatened, sensitive and special interest plants or within 25 feet of live streams and meadow/wetlands.

## Soils

1. Soil quality standards and appropriate best management practices (BMP) that protect forest soils would be implemented for the entire project. Best management practices and soil standards are described in Water Quality Management for Forest System Lands in California, Best Management Practices (2011), Lassen Forest Plan (1993), and Northwest Forest Plan (1993)
2. In treatment units outside of riparian reserve areas, soil moisture conditions would be evaluated using Forest-established visual indicators before equipment

operation proceeds. Lassen National Forest wet weather operations and wet weather haul agreements would be followed to protect the soil and transportation resources.

3. Areal extent of detrimental soil disturbance would not exceed 15 percent of the area dedicated to growing vegetation. Following implementation, the mechanical treatment units would be evaluated by a qualified specialist to determine if detrimentally compacted ground exceeds the forest plan standard of 15 percent areal extent. If restoration is needed to achieve compliance, an appropriate subsoiler, ripper or other implement would be used to fracture the soil in place leaving it loose and friable.
4. In mechanical treatment units, landings within treated areas no longer needed for long-term management would be evaluated by a qualified specialist to determine whether remediation is needed to restore productivity and hydrologic function. If so, appropriate remediation would be implemented. Where landing construction involved cut and fill, the landing would be re- contoured to match the existing topography.
5. Machine piling operations would remove only enough material to accomplish project objectives and would minimize the amount of soil being pushed into burn piles. Duff and litter layers would remain as intact as possible, and the turning of equipment would be minimized.
6. To the extent possible, existing landings and skid trails would be used.
7. Mechanical equipment would not operate on slopes greater than 35 percent.

## Wildlife

1. As per the NWFP, a minimum of 120 linear feet of downed logs per acre greater than or equal to 16 inches in diameter and 16 feet long should be retained, except where such retention poses increase risk of wildfire spread (within 500' of private lands and 200' of roads). Within 500' of private lands and 200' of roads LWD and snag retention shall comply with the table below. Decay Class 1 and 2 logs can be counted towards this totals. Down logs should reflect the species mix of the original stand.

Table 8: Snag and Large Woody Debris Retention Guidelines

Desired LWD and Snags Retention per Acre within 500' of Private Lands and 200' of Roads	Desired LWD & Snags per Acre greater than 500' from Private Lands and 200' of Roads
0-2 logs (>16")	4 logs (> 16")
0-2 snags (>15")	3.5 snags (> 15")

2. Bald Eagle: The bald eagle (*Haliaeetus leucocephalus*) is federally delisted (as of August 2007), a state endangered species, a California Department of Fish and Wildlife (CDFW) Fully Protected Species, a U.S. Forest Service (USFS) Sensitive Species, and a permanent resident within the northern portion of the Project around Lake Britton. Two types of habitat are identified in the Project area based upon their importance to bald eagles:
3. Nesting Habitat: This habitat is designated immediately around all past and present nest sites located in and immediately adjacent to the Project area. The size and shape of the designated area varies at each nest territory depending on topography, number of nest sites in the territory, and the known habits of each eagle pair. This designation is the most restrictive with regard to timber management and human activity.
4. Essential Habitat: This habitat designation includes all areas used by bald eagles for nesting, foraging, perching or roosting, and it includes the areas designated as Nesting Habitat. This designation, although not as restrictive as nesting habitat, also imposes limitations on timber. The boundary of Nesting Habitat includes a protective buffer around presently-used nesting trees as well as historical nesting sites, since the latter represent a secure location for the eagles and may become active in following years. Certain bald eagle pairs regularly use and thus maintain multiple alternative nests within their Nesting Habitat area, while others use just one or sometimes two traditional nest trees. The availability of adequate nesting structure often determines the number of nest sites used. Drought and subsequent fall-down has claimed several trees in the past forcing the eagles to relocate numerous times.
5. Nesting habitat occurs within northeast portion of Units and the southern half of Unit 7. A small portion of Unit 2 is in Essential Habitat.
6. Limited Operating Period (LOP) Restrictions: Between January 1 to August 1 compatible habitat alterations in the Nesting Habitat and Essential Habitat zones are only allowed outside the LOP to avoid adverse impacts to bald

eagle breeding and provisioning (foraging for young). If a nesting attempt fails during any month of a certain breeding season, this LOP restriction in Nesting Habitat can be eased. In Essential Habitats other than Nesting Habitat, routine activities along existing roads are generally permissible during the LOP without consultation.

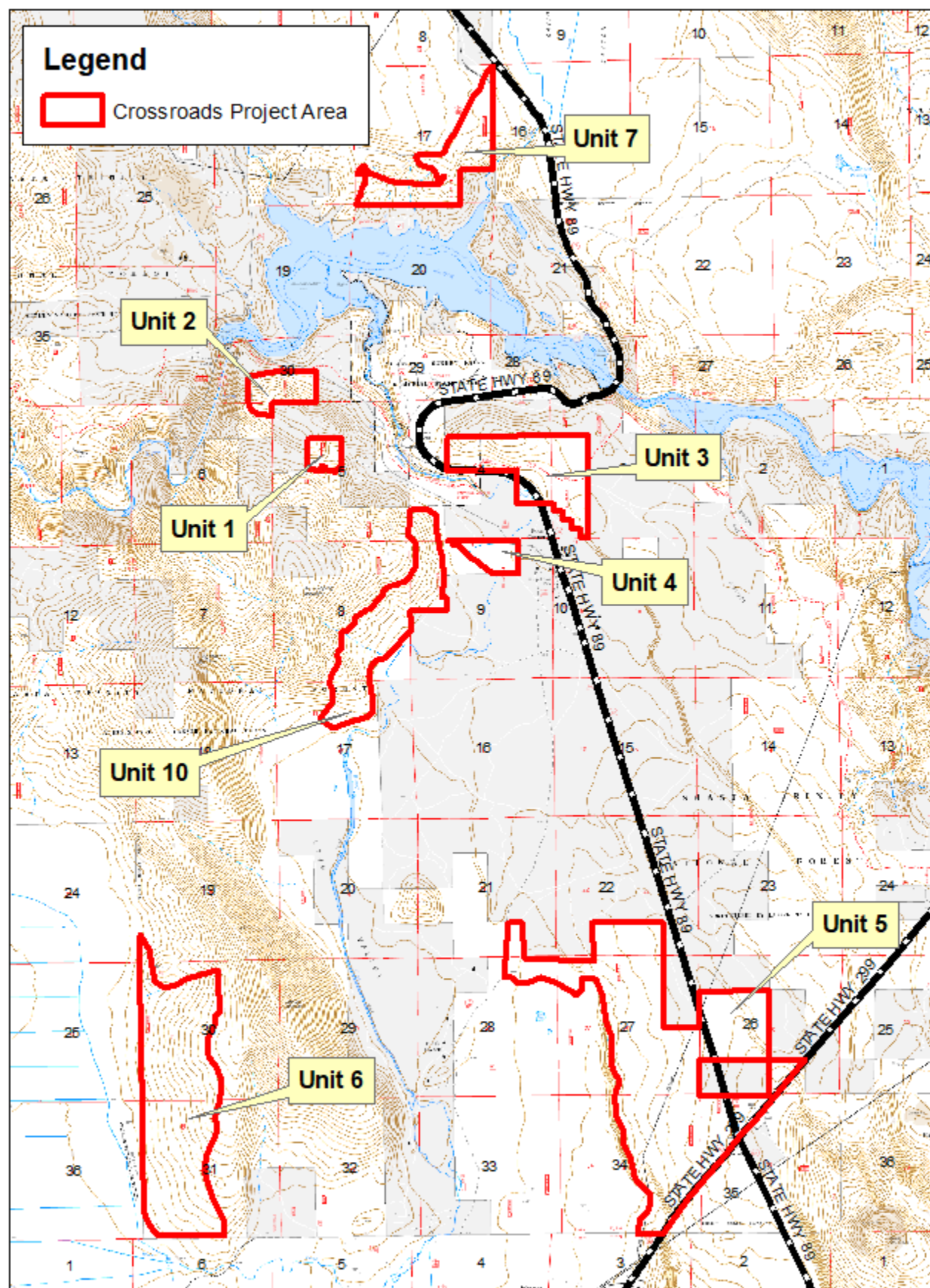
7. Habitat Alterations: Within the upper forest canopy in delineated Nesting Habitat, and Essential Habitat: the following conditions are recommended to maintain existing habitat suitability (can be applied to both regeneration or thinning treatments), a silvicultural prescription to encourage long-term regeneration of large pines and reduce fuels. The objective of this prescription is to provide a perpetual minimum stocking level in the Nesting and Essential habitats of eight Dunning Class V trees per acre. To achieve this objective, the following management strategy is:
8. Remove only those Dunning III [large, mature] and V class trees expected to die within five to ten years using a modified risk class rating system. This strategy attempts to maintain a balance between keeping the best Dunning V nest trees while minimizing losses due to insect buildup in high-risk trees that could spread to adjacent trees.
9. Pre-commercially thin the overstocked understory to the point where maximum individual tree growth can be achieved while still having enough stocking to account for long-term mortality. This point was established at 55 trees per acre with 15 square feet of basal area.
10. Commercially thin stands to 50 square feet per acre in EPN stands and 75 square feet per acre in SMC stands.
11. Retain large diameter live cull trees greater than 12 inches in diameter with unique qualities that may be of use by wildlife. This includes retaining some mid- and large diameter live trees that are currently in decline, have substantial wood defect, or that have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole) to serve as future replacement snags and to provide nesting structure.
12. For the Northern Goshawk the following IDFs would be applied: If a northern goshawk nest is detected, a 200-acre goshawk protected activity center (PAC) would be established around the nesting site; An LOP would occur from February 15 – September 15, if the nest site is located within ¼ mile of project activities.

13. If a California spotted owl nest is detected, a 300-acre spotted owl protected activity center (PAC) shall be established around the nesting site; If the nest is within  $\frac{1}{4}$  mile of the proposed project a limited operating period (LOP) of March 1 through August 15 would be in effect.



## Appendix B: Maps

# Crossroads Project Treatment Units

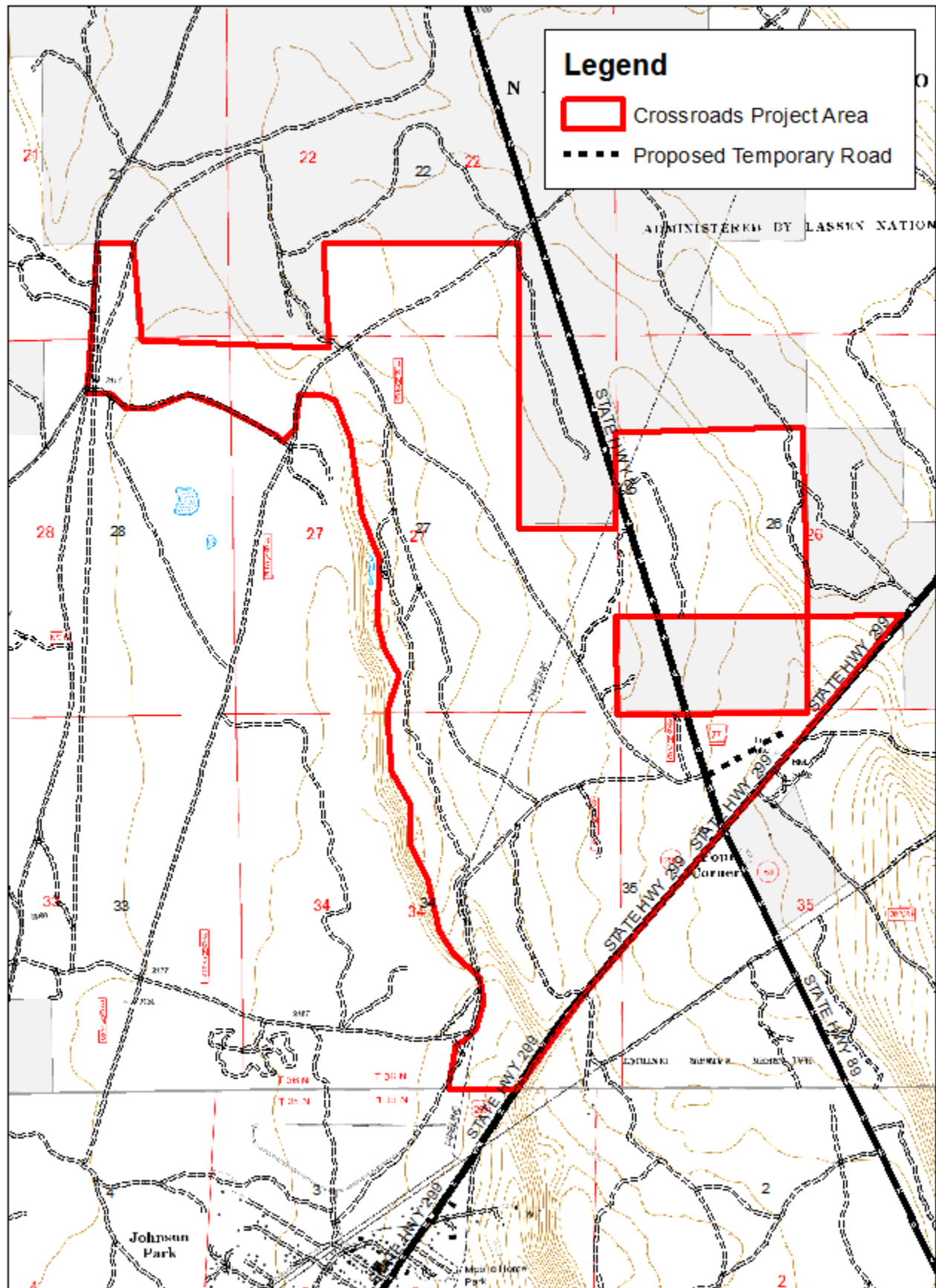


0 0.375 0.75 1.5 2.25 3 Miles

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# Crossroads Project

## Unit 5 Proposed Temporary Roads

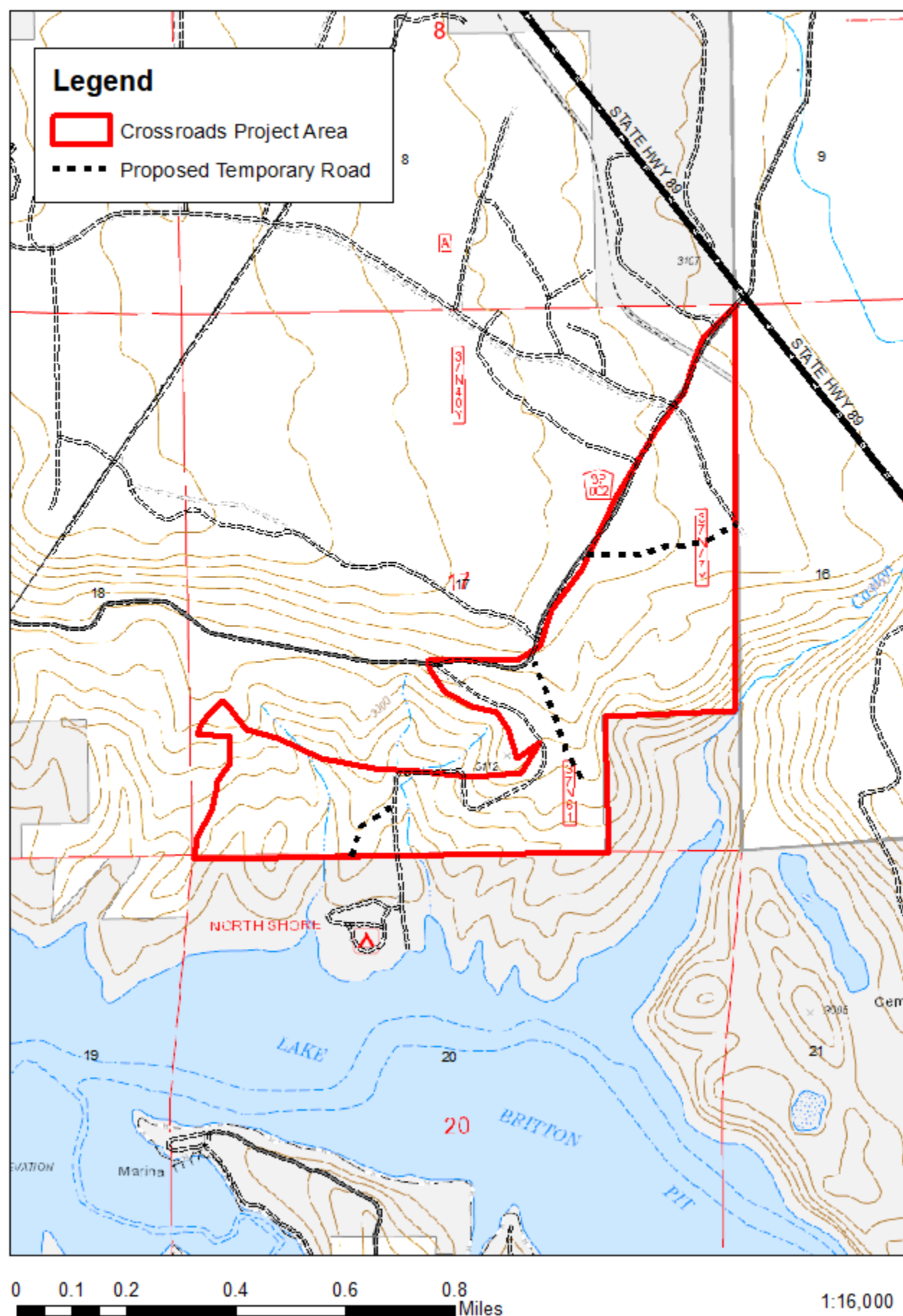


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# Crossroads Project

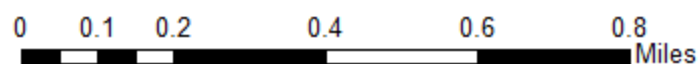
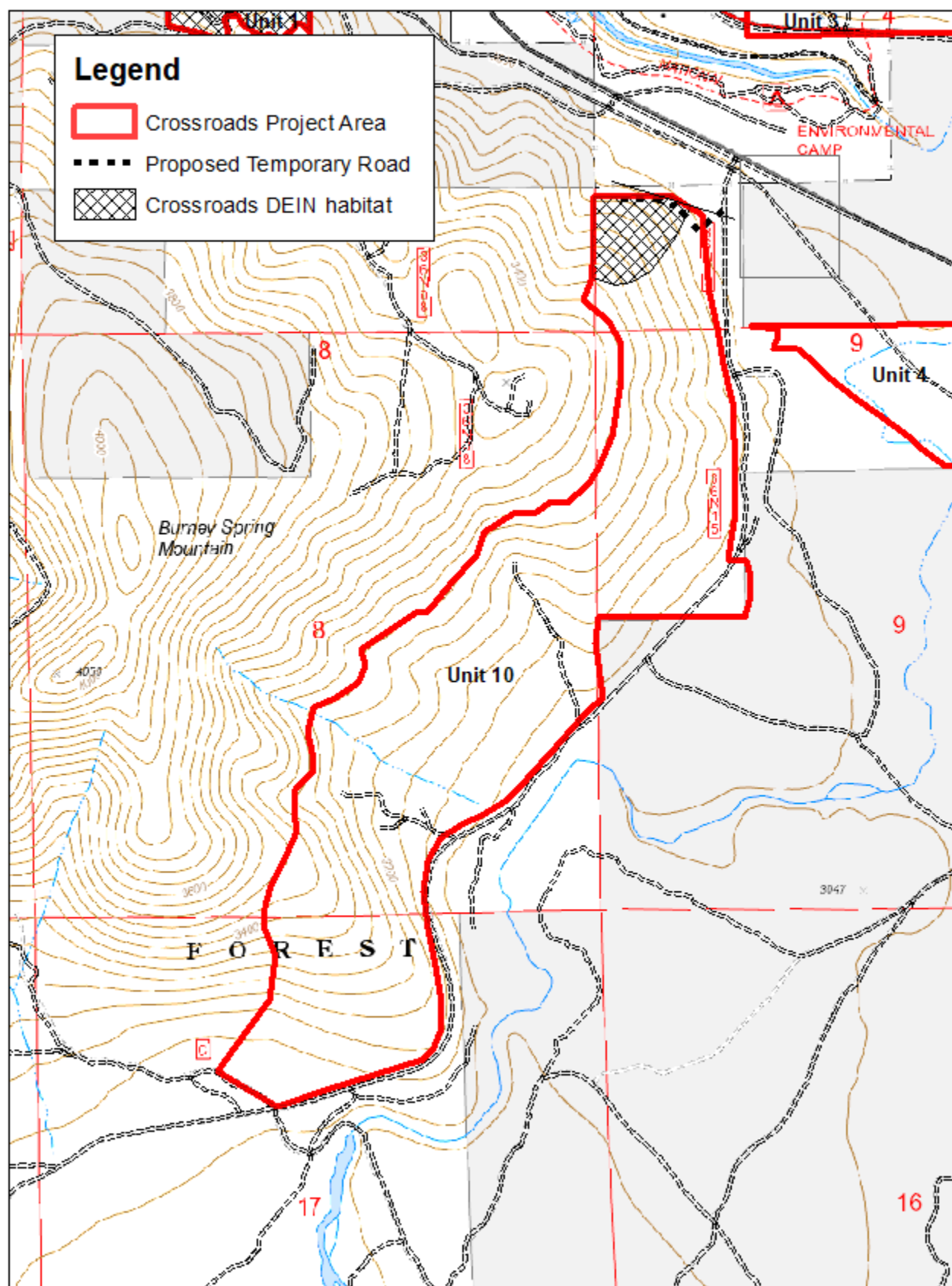
## Unit 7 Proposed Temporary Roads





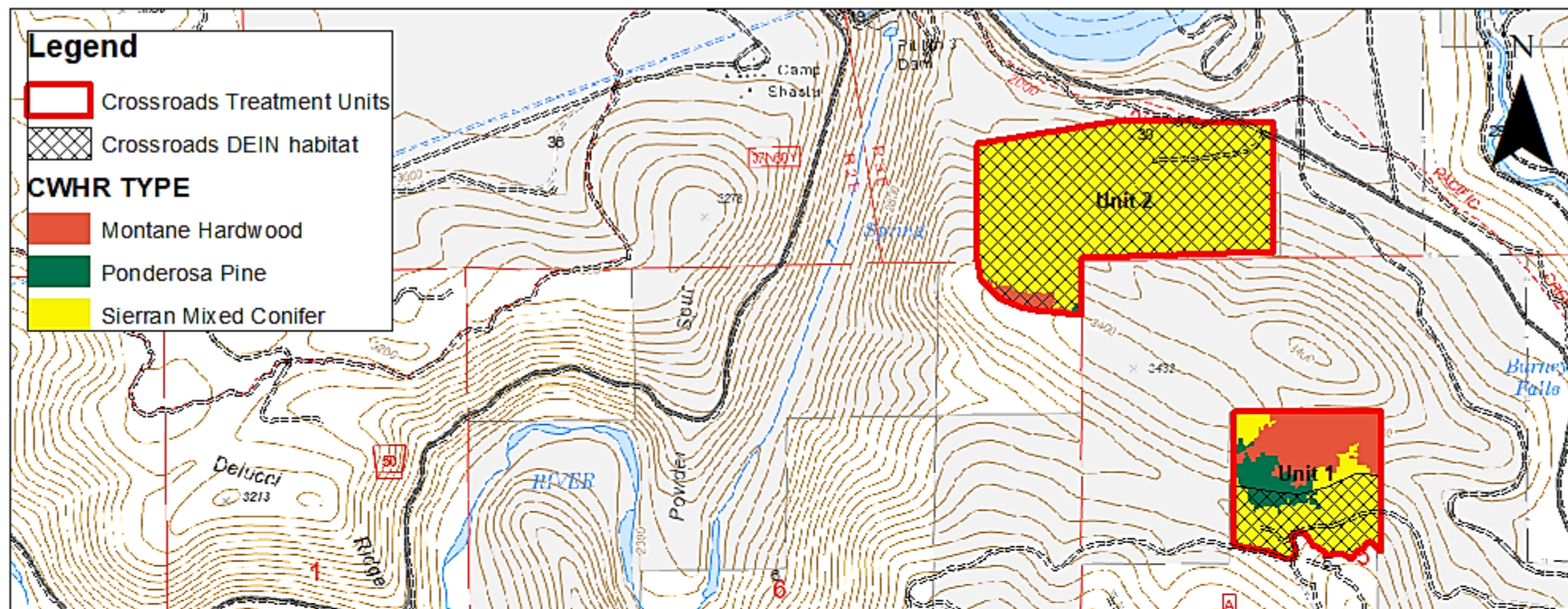
# Crossroads Project

## Unit 10 Proposed Temporary Roads



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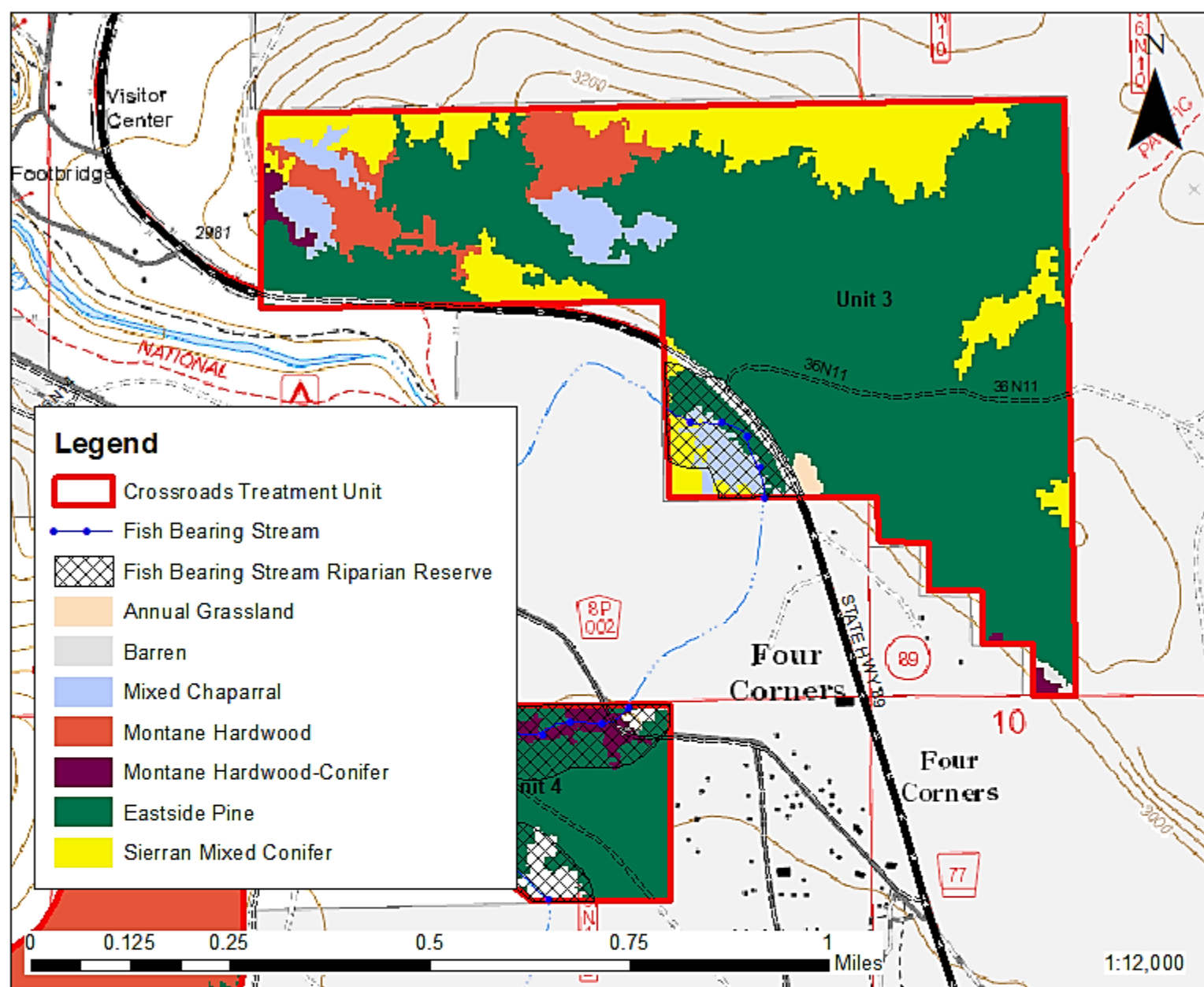
## Crossroads Unit 1 and 2 Treatment by CWHR Type



Treatment Unit	CWHR Class	Acres per CWHR Class	Treatments
1	<b>Oak Woodland Stands</b>		
	MHW	12	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	<b>Forest Stands</b>		
	EPN	5	Sanitation-Salvage and Thin to 50 sq. ft basal area/acre. If stand does not have 50 sq. ft basal area/acre do not thin. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	SMC	2	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
2	SMC with DEIN (Olive-thorn Lichen)	17	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Retain all oaks during mechanical or hand thinning treatments. Thin occupied habitat only if conifer encroachment threatens the persistence of oaks, and then only in areas where large conifers will provide adequate shading to maintain microclimate. Retain larger overstory trees but thin smaller fuels in occupied stands. Do not radial thin around oaks.
	<b>Oak Woodland Stands</b>		
	MHW	2	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	<b>Forest Stands</b>		
	SMC with DEIN (Rare Olive-thorn Lichen)	74	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Retain all oaks during mechanical or hand thinning treatments. Thin occupied habitat only if conifer encroachment threatens the persistence of oaks, and then only in areas where large conifers will provide adequate shading to maintain microclimate. Retain larger overstory trees but thin smaller fuels in occupied stands. Do not radial thin around oaks.



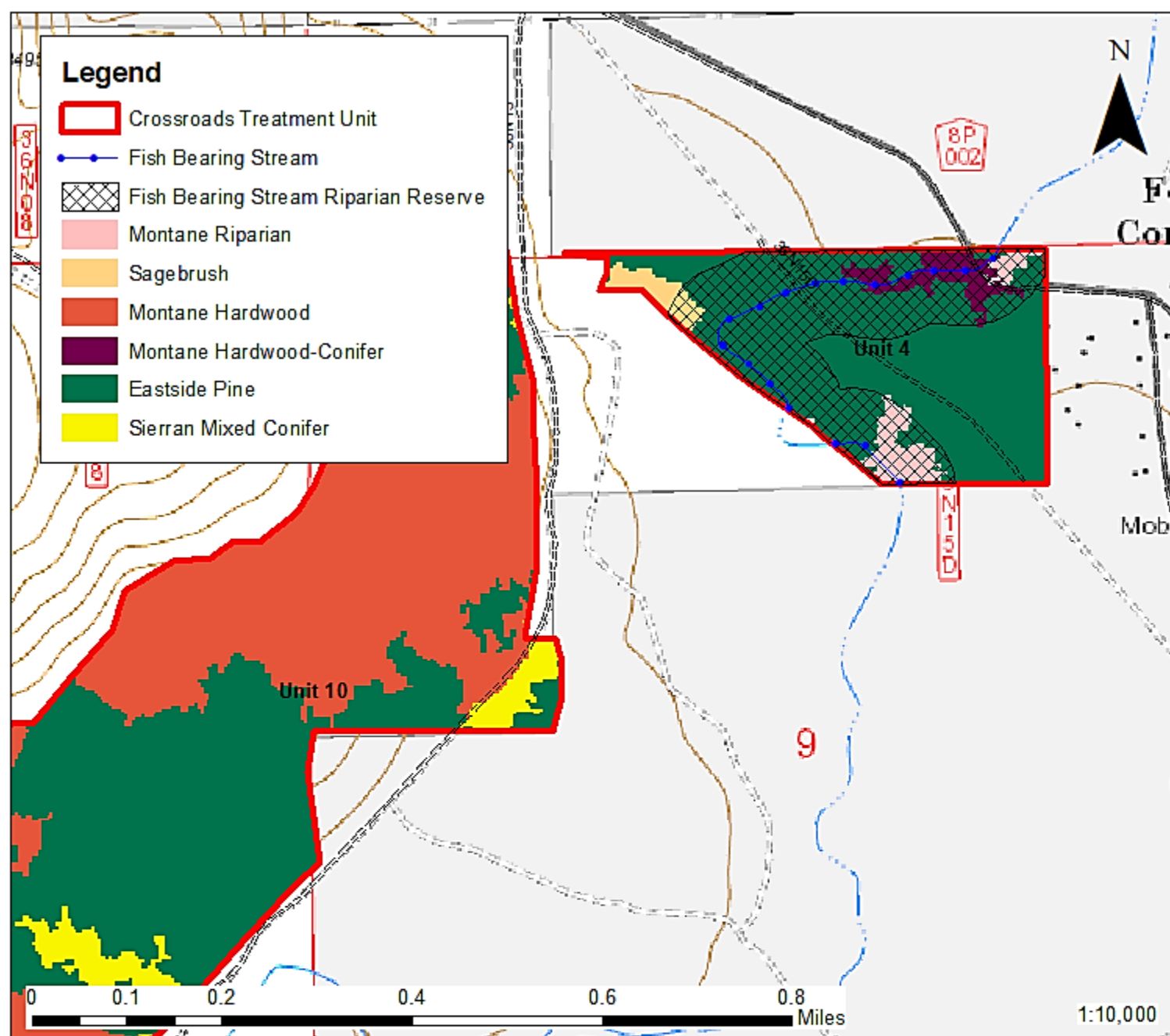
### Crossroads Unit 3 Treatment by CWHR Type



Treatment Unit	CWHR Class	Acres per CWHR Class	Treatments
4	No Proposed Treatment		
	SGB	2	No treatment
	Forest Stands		
	MHC	3	Sanitation-Salvage the conifers. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	EPN	44	Sanitation-Salvage and Thin to 50 sq. ft basal area/acre. If stand does not have 50 sq. ft basal area/acre do not thin. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	Riparian Reserve		
	MRI	3	Treatment in the Riparian Reserve section
	Riparian Reserve (RR)		100 foot EEZ. Sanitation-Salvage only in the EEZ. Operators may reach in and remove whole trees. Remove conifer snags but retain 3.5 snags (> 15")/acre in the inner 100 feet. Reduce hardwoods and brush by 50%. Hand treat and pile. Place piles at least 50 feet from bank full edge of creek within the inner 100 feet. 101-300 feet- Reduce fuels (remove conifer snags to 0-2 snags/acre within 200 feet of roads. Thin to EPN standards. Reduce hardwoods and brush by 50%. Machine pile.



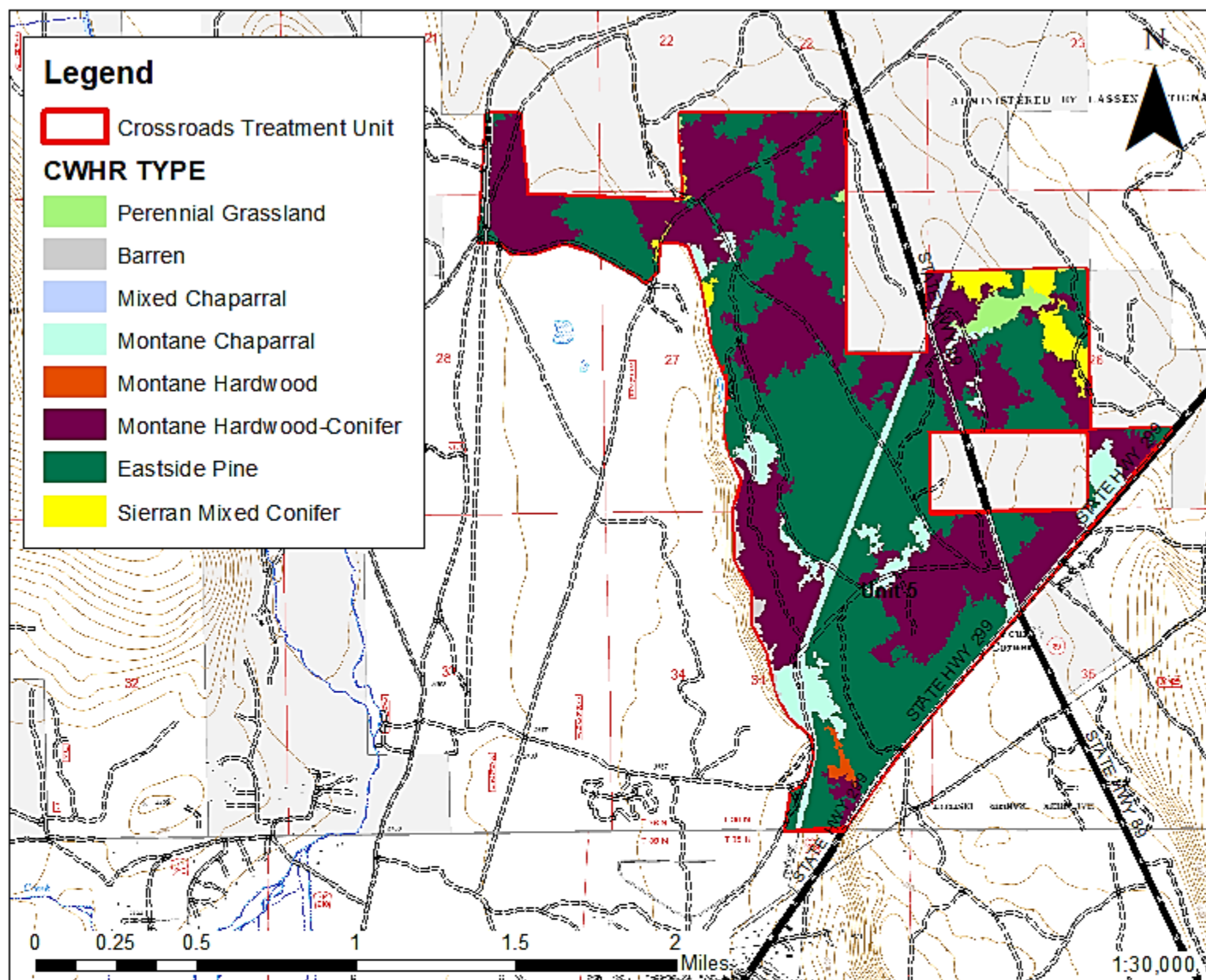
# Crossroads Unit 4 Treatment by CWHR Type



Treatment Unit	CWHR Class	Acres per CWHR Class	Treatments
4	<b>No Proposed Treatment</b>		
	SGB	2	No treatment
	<b>Forest Stands</b>		
	MHC	3	Sanitation-Salvage the conifers. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	EPN	44	Sanitation-Salvage and Thin to 50 sq. ft basal area/acre. If stand does not have 50 sq. ft basal area/acre do not thin. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	<b>Riparian Reserve</b>		
	MRI	3	Treatment in the Riparian Reserve section
	Riparian Reserve (RR)		100 foot EEZ. Sanitation-Salvage only in the EEZ. Operators may reach in and remove whole trees. Remove conifer snags but retain 3.5 snags (> 15")/acre in the inner 100 feet. Reduce hardwoods and brush by 50%. Hand treat and pile. Place piles at least 50 feet from bank full edge of creek within the inner 100 feet. 101-300 feet-Reduce fuels (remove conifer snags to 0-2 snags/acre within 200 feet of roads. Thin to EPN standards. Reduce hardwoods and brush by 50%. Machine pile.

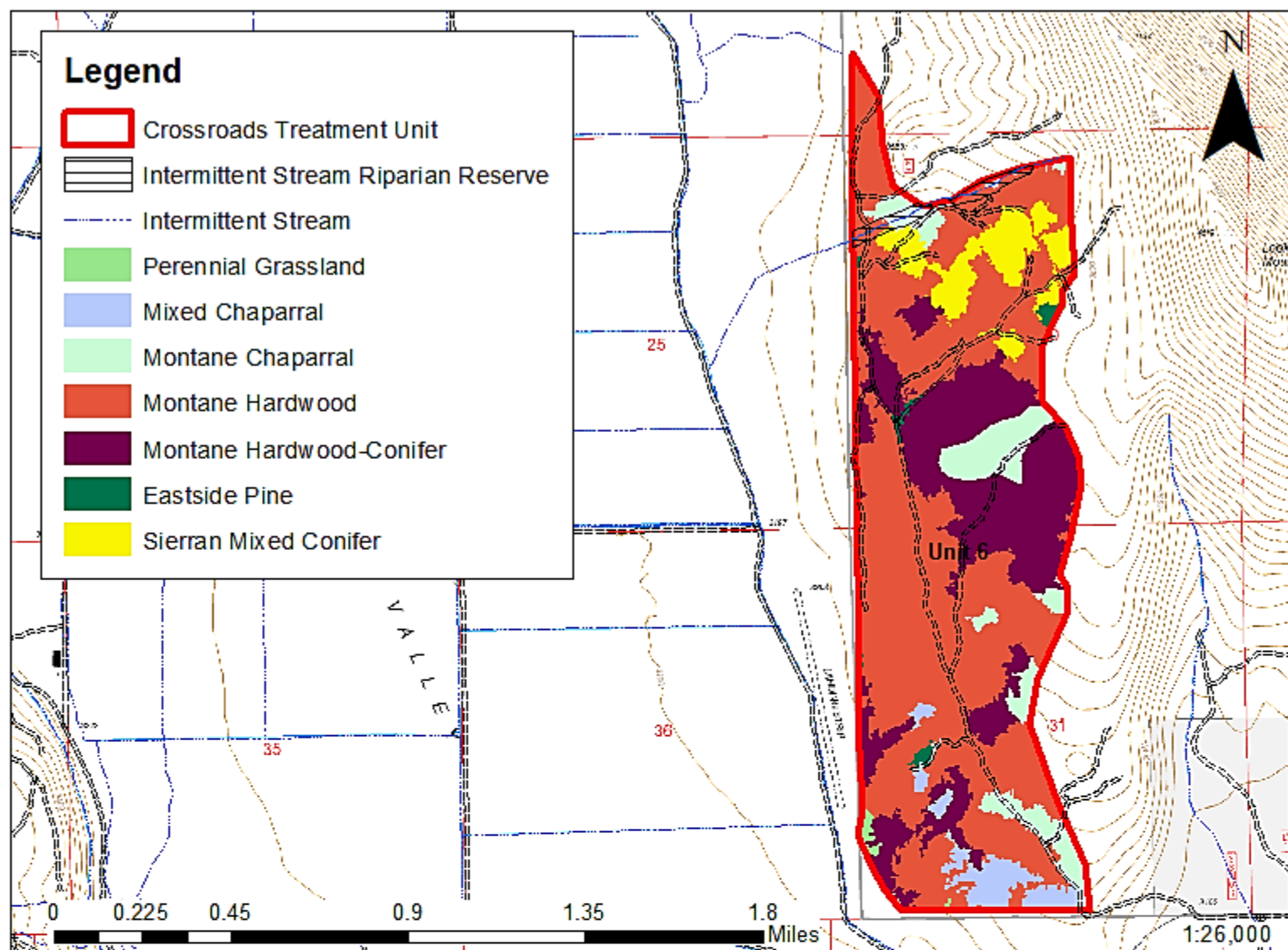


# Crossroads Unit 5 Treatment by CWHR Type



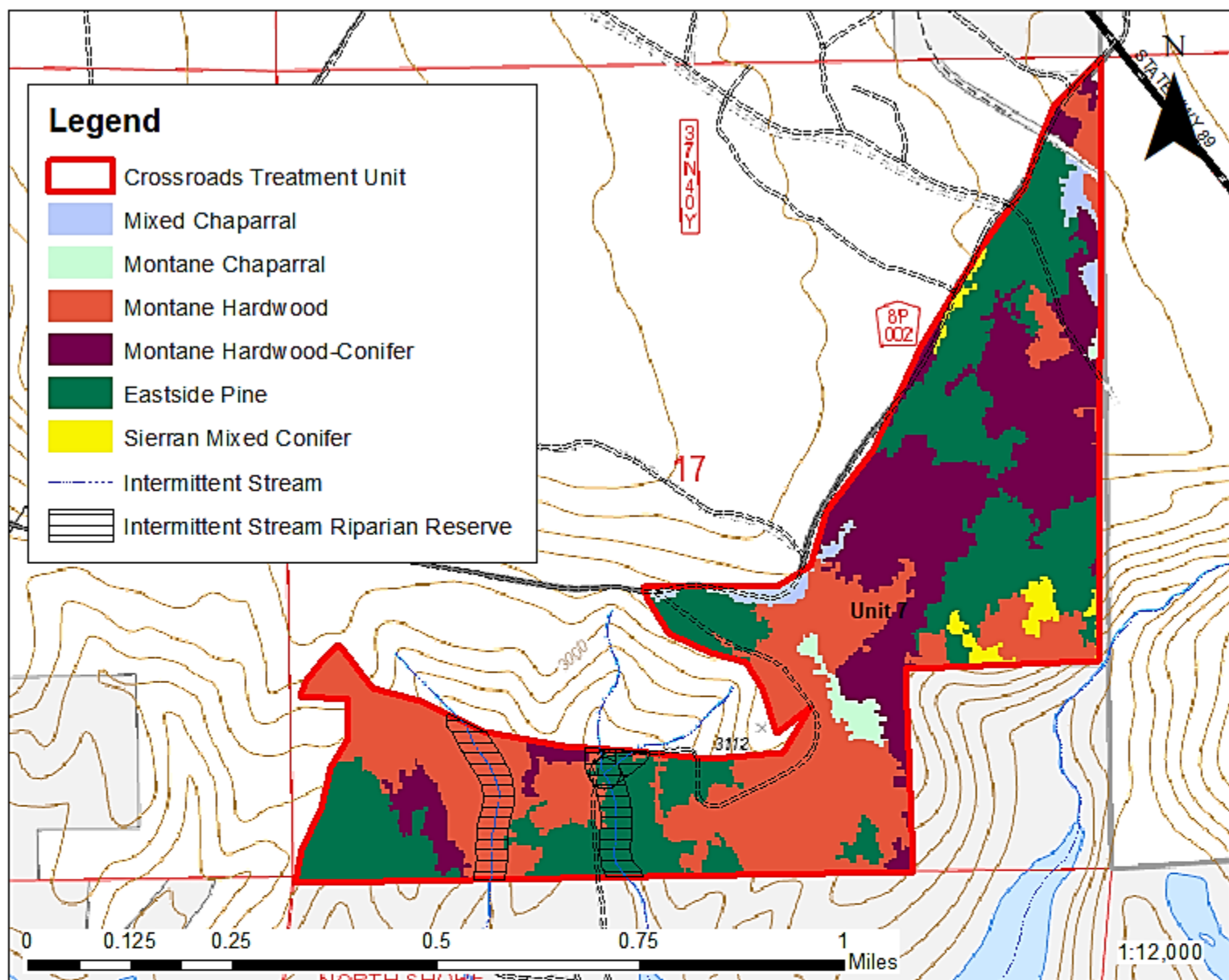
Treatment Unit	CWHR Class	Acres per CWHR Class	Treatments
5	No Proposed Treatment		
	Barren	20	No Treatment
	PGS	13	
	Brush Dominated Stands		
	MCP	79	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	MCH	2	
	Oak Woodland Stands		
	MHW	3	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	Forest Stands		
	MHC	457	Sanitation-Salvage the conifers. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	EPN	476	Sanitation-Salvage and Thin to 50 sq. ft basal area/acre. If stand does not have 50 sq. ft basal area/acre do not thin. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	SMC	35	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.

# Crossroads Unit 6 Treatment by CWHR Type



Treatment Unit	CWHR Class	Acres per CWHR Class	Treatments
6	No Proposed Treatments		
	PGS	4	No Treatment
	Brush Dominated Stands		
	MCP	52	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	MCH	23	
	Oak Woodland Stands		
	MHW	351	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	Forest Stands		
	MHC	150	Sanitation-Salvage the conifers. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	EPN	3	Sanitation-Salvage and Thin to 50 sq. ft basal area/acre. If stand does not have 50 sq. ft basal area/acre do not thin. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	SMC	40	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	Riparian Reserve		
	Riparian Reserve (RR)	9	50 foot EEZ. Sanitation-Salvage only in the EEZ. Operators may reach in and remove whole trees. Remove conifer snags but retain 3.5 snags (> 15")/acre in the 100 foot RR. Reduce hardwoods and brush by 50 %. Hand treat and pile. Place piles at least 25 feet from bank full edge of creek. 51-100 feet- Thin to SMC standards. Reduce hardwoods and brush by 50%. Machine pile

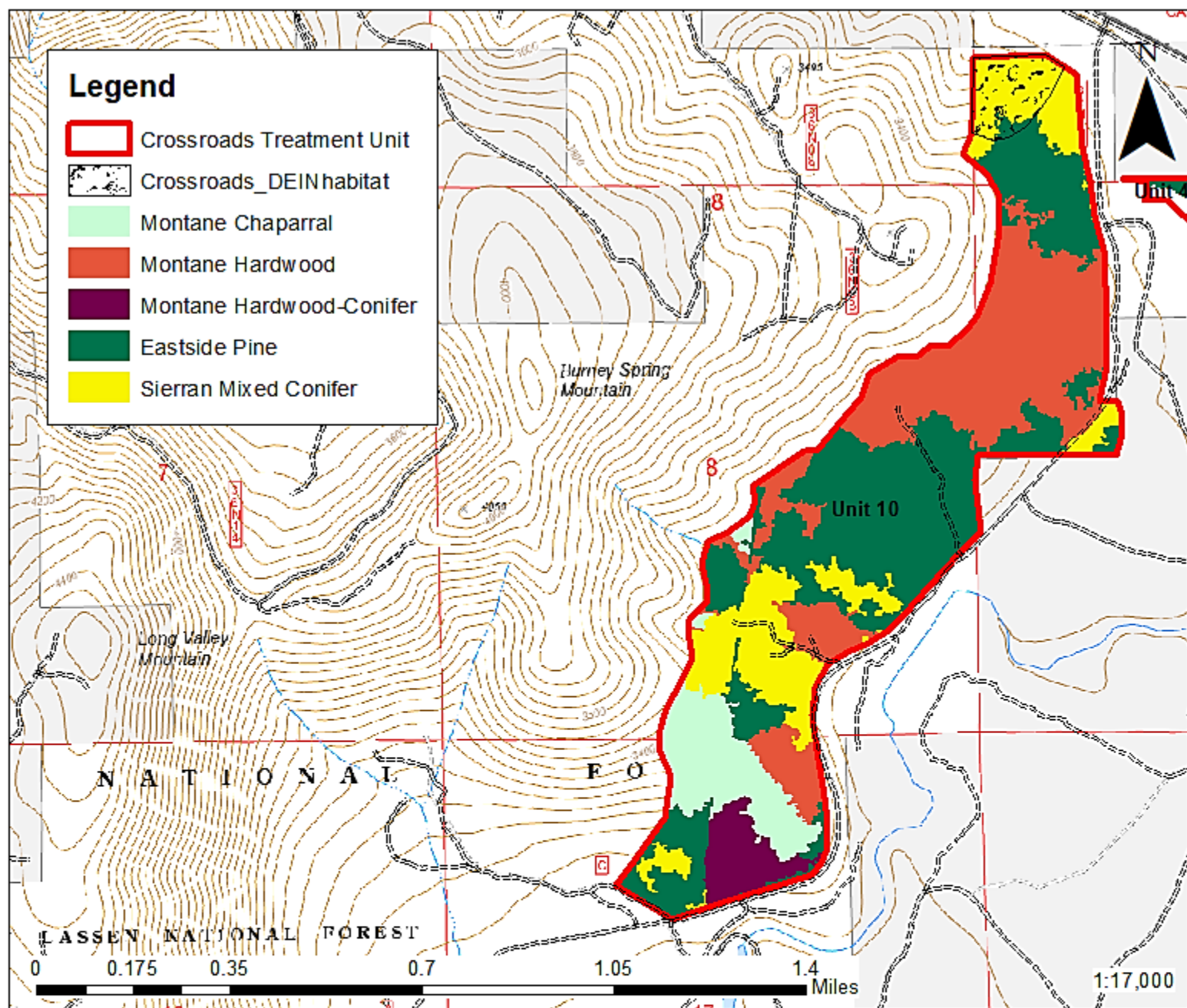
# Crossroads Unit 7 Treatment by CWHR Type



Treatment Unit	CWHR Class	Acres per CWHR Class	Treatments
7	Brush Dominated Stands		
	MCH	4	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	MCP	3	
	Oak Woodland Stands		
	MHW	73	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	Forest Stands		
	MHC	53	Sanitation-Salvage the conifers. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	EPN	44	Sanitation-Salvage and Thin to 50 sq. ft basal area/acre. If stand does not have 50 sq. ft basal area/acre do not thin. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	SMC	29	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	Riparian Reserve		
Riparian Reserve (RR)	11	50 foot EEZ. Sanitation-Salvage only in the EEZ. Operators may reach in and remove whole trees. Remove conifer snags but retain 3.5 snags (> 15")/acre if RR is farther than 200 feet from a road. Retain 0-2 snags (>15")/acre if RR is within 200 feet of a road. Reduce hardwoods and brush by 50%. Hand treat and pile within the inner 50 feet of creek. Place piles at least 25 feet from bank full edge of creek. 51-100 feet- Thin to EPN standards. Reduce hardwoods and brush by 50%. Machine pile.	



# Crossroads Unit 10 Treatment by CWHR Type



Treatment Unit	CWHR Class	Acres per CWHR Class	Treatments
10	<b>Brush Dominated Stands</b>		
	MCP	29	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	<b>Oak Woodland Stands</b>		
	MHW	91	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	<b>Forest Stands</b>		
	MHC	13	Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	EPN	20	Sanitation-Salvage and Thin to 50 sq. ft basal area/acre. If stand does not have 50 sq. ft basal area/acre do not thin. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	SMC	137	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Reduce fuels by removing approximately half of the hardwood and brush components using the double the diameter or canopy rule.
	SMC with DEIN (Rare Olive-thorn Lichen)	13	Sanitation-Salvage and Thin to 75 sq. ft basal area/acre. Retain all oaks during mechanical or hand thinning treatments. Thin occupied habitat only if conifer encroachment threatens the persistence of oaks, and then only in areas where large conifers will provide adequate shading to maintain microclimate. Retain larger overstory trees but thin smaller fuels in occupied stands. Do not radial thin around oaks.